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CAR AND DRIVER

JUN/2017

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The Hellcat's ornery
stepfather breaks the
800-hp barrier!



Bonus:
Hellcat V-8
stuffed
into the
**2018 JEEP
TRACKHAWK**

p. 017

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How the Ford Mustang GT holds up after
40,000 miles // Audi RS3 and Q5 driven //
12 cars to collect now // Honda and Toyota
hydrogen fuel-cell cars face off!



zoom-zoom

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2016 FORD MUSTANG GT

Wherein Ford's modern-
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before our eyes.
by Mike Sutton

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Because Dodge
Mephistopheles is too
hard to spell.
*photography by
Roy Ritchie*

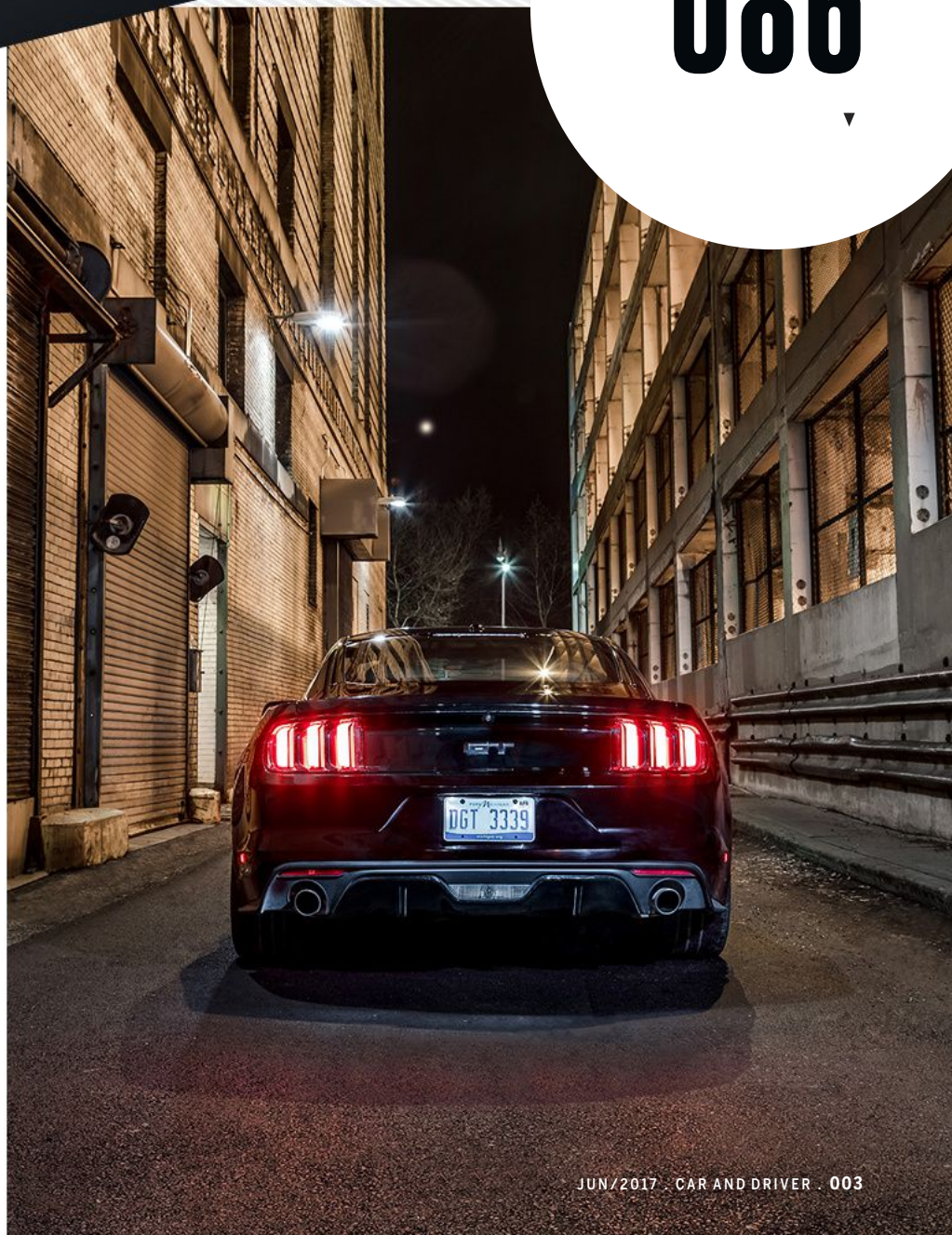
Car and Driver[®] vol. 62, no. 12

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“The Mustang GT quickly
gained supporters for its
sinister presence and a
design penned with just
the right amount of retro.”

—MIKE SUTTON, 2016 FORD MUSTANG GT

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Another month in which a J.W. Hoyt letter stabs us in the face with boredom.

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John Buffum.

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2018 CHEVROLET EQUINOX

GM finally gets the small crossover right.
CARandDRIVER.com/2018Equinox

MAZDA CX-5

Still the best compact SUV to drive, now better at other things, too.
CARandDRIVER.com/2017CX5

PORSCHE 911 TURBO CABRIOLET

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Backfires: The joyful noise of the commentariat, rebutted sporadically by Ed.

LIL' ROMEO

Give me a break! Not one of you would actually shell out \$79K on the Alfa Romeo in hopes that the reliability issues uncovered in your comparison test ["A Sports-Sedan Tragicomedy," March 2017] would magically disappear. Everyone knows that is just the tip of the iceberg of the kooky crap that will plague that car. Spongy brakes, cheap interior, and an electrical gremlin that has already reared its head? So are we to assume the BMW payroll checks have now been supplanted by those from Alfa?

—Tyler Thomas
Leawood, KS

Just want to say I appreciate the inclusion of all the players (well, almost... Audi S4?). I've often thought previous contenders should still be compared to new entries; sure, the BMW won last time, but what if I just am not fond of the BMW and want to see how the others stack with the new player?

—Andrew Gibson
Savannah, GA

With 354 horsepower, the new S4 would be 90 down on the test's least powerful car, the BMW M3—Ed.

I was very amused that you ranked the Alfa Giulia first in this competition despite its electrical problems. As a former Alfa owner I think everyone should buy a sexy Alfa once in their lives, just to remind themselves of what terrible decisions they are capable of making.

—Tom Cope
Westport, CT

I've always been an Alfa fan and was considering the Giulia—but I just cannot understand how you could give it a first-place ranking when it failed twice throwing a code? I think it's pretty unfair that the test was completed by having an OBD II scanner on hand to get it running again. It's this unreli-



"I THINK EVERYONE SHOULD BUY A SEXY ALFA ONCE IN THEIR LIVES, JUST TO REMIND THEMSELVES OF WHAT TERRIBLE DECISIONS THEY ARE CAPABLE OF MAKING."

ability that would make me steer clear of an Alfa! In the real world, it's tow-truck time.

—Viraf Pudumjee
Palos Verdes
Estates, CA

The Alfa never stopped running or left us stranded. Though it did go into its low-boost Advanced Efficiency mode and wouldn't come out without the scan tool—Ed.

Regarding your comparison test in the March issue: I couldn't believe you chose the Alfa above the BMW, Cadillac, and Mercedes. Borrowing a new car and bashing it about in the boonies for a week bears absolutely no resemblance to actually owning one for an extended length of time. If your knowl-

edgeable and well-equipped crew, with a scanner and tools, couldn't keep it in running order for a week, what chance does an ordinary mortal who purchases one for his daily driver have? Gives one a preview of coming attractions, doesn't it?

—Bob Morrow
Cincinnati, OH

Your concern is precisely why we reported the problem—Ed.

As someone whose ooze for Alfas is a result of indoctrination by my late father—he owned four total, one of which was passed on to me—I am certainly a ready-made mark for the new Giulia. But without the option of a manual, all I can say is, Dad, I know that

you also liked my Mazda RX-8.

—Lyn Vogel
Troy, NY

“...because superiority in this segment is a game of inches.”

I don't understand how a brand-new \$80K car that doesn't run is superior to cars that do. Needing to use an OBD II scanner should be an instant disqualifier during any new-car test.

Lastly, you published a letter from my brother Sanjay in your January issue. He has a Ph.D. in chemistry and works at MIT, yet yours is the publication that he won't shut up about.

—Sunil Hari
Bethesda, MD

Your brother is much cooler—Ed.

I dated Giulia Quadrifoglio—a nice Italian girl with an alpha personality—in high school. As I recall, she was easy on the wallet, had near-perfect fit and finish, and performance that couldn't be topped. Whenever Giulia and I got together with her two best girlfriends, the experience lived up to her last name.

—David Sheatsley
Ashburn, VA

Coincidentally, I went to high school with an Italian exchange student named Giulia Quadrifoglio. She never lost a comparison test, either.

—Carl Schiller

Bloomfield Hills, MI

One is funny. Two is sad—Ed.

You note in your comparison test that the Alfa has picked up Mazda's interior-design cues. C'mon. That doesn't go nearly far enough. The car looks like a Mazda 3.

—Aaron Michael
Gordon
Washington, DC

Here in the Sunshine State, it's not an issue, but I can't help wondering where they're going to put a front license plate on that Italian beauty.

—Don Estey
Vero Beach, FL

Probably where the sun don't shine—Ed.

In regard to the Cadillac ATS-V and its engine somehow “letting it down,” I'd like to point out the BMW's “six” was louder at full throttle and cruise, and it produced less power than the Cadillac's engine. There's no need for an LT1 V-8,

“NEEDING TO USE AN OBD II SCANNER SHOULD BE AN INSTANT DISQUALIFIER DURING ANY NEW-CAR TEST.”



Explained: Tired Out

Of course the Alfa Romeo Giulia Quadrifoglio had the best skidpad and braking performances in the test; it was on track tires (Pirelli P Zero Corsas). I wonder how it'd do with Michelin Pilot Super Sports like the rest of the group.

—William Rubin
Liverpool, England

We wanted to retest the Giulia Quadrifoglio on the Michelin Pilot Super Sports, but a matched set isn't available in the Giulia's staggered sizes. After discussing the matter with the experts at Tire Rack, we decided to

run the Giulia on Continental's ExtremeContact Sports, a new tire with Pilot Super Sport-like performance. We retested the same Giulia Quadrifoglio used in the comparo on the new rubber.

On the road, the Continentals didn't feel any different than the Pirellis—same sharp steering response, impressive grip, and supple ride. With the test equipment attached, the Alfa's numbers revealed a slight drop in grip while braking, on the skidpad, and in the launch. Rolling on the Continentals, the Alfa's numbers were more in line with the rest of the group, though the difference wasn't enough to affect the finishing order—Ed.

	Pirelli P Zero Corsa	Continental ExtremeContact Sport
0–30 mph	1.6 sec	1.7 sec
0–60 mph	3.6 sec	3.9 sec
0–100 mph	8.1 sec	8.4 sec
5–60 mph	4.2 sec	4.2 sec
70–0 mph	143 ft	156 ft
Roadholding, 300-ft-dia skidpad	1.00 g	0.96 g

given the fact that a good ECU tune alone on the LF4 can yield more than 500 horsepower at the rear wheels with no further modifications. I'll grant you the knock on the dashboard—the fact that there is no electronic dash like what is available on the CTS V-Sport Premium makes the price of admission on an ATS-V hard to swallow. The dash looks as if it's straight out of my former 1997 Chevy Camaro Z28.

—Ryan R.

Liberty Hill, TX

Like Nickelback, Cadillac's problem is with the sound, not the volume—Ed.

As a reader since 1983, I've never been moved to write until now. My '08 BMW 550i started leaking oil, so rather than pay \$6K to fix it, I've been hunting for a lightly used replacement. Good luck finding an S6, M3, CTS-V, or C63 in a color other than black or white with a black interior. Lo and behold, turns out all used M3s cost between \$55K and \$65K for the first year of the current generation, but a brand-new one starts at \$64K. Voilà, I negotiated a price of just under \$62K for a brand-new 2017 M3 with Silverstone exterior and

silver leather interior as the only two options. It comes standard with a six-speed manual, adaptive suspension, 18-inch wheels—I took your advice on the 19s' hard ride—carbon-fiber roof, and the same 425-hp screamer that every other M3 has. Its brilliant packaging means it has better back-seat room than all but the CTS-V—awesome but too much money, even used. So I was a little confounded by the third-place finish for the M3 until I read that you didn't take your own advice—and long-term advice at





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that—and ordered the silly \$4K Competition package with even bigger 20-inch tires and a harder suspension for \$88K! Why? Maybe mine doesn't take the Alfa, but it certainly beats the C63 S and hands down wins the value vote. The Alfa is cool, but it will fall apart shortly, sell about 5000 units, and plummet in value faster than Italy's bank debt. Honestly, you guys need to start testing cars with as few options as possible. That is where the value is. Save the manuals!

—John Lee
Devon, PA

You ordered your M3 in much the same way we'd have it. For this test, we wanted to try out the newly available Competition package, but BMW only had a well-equipped example available for testing—Ed.

I enjoyed the Alfa comparison. It's great to see a new entry go straight to the head of the pack. Now it's time to replace my trusty steed, but I'm still in a quandary. I need a car that genuinely seats five (human) adults and has some spirit, and I really want to shift the gears myself. As GM refuses to ship the Chevy SS north of the border, and FCA has ignored all articles and calls from enthusiasts *begging* for the manual Giulia to come to our shores, is the (barely) third-place BMW M3 it? I'm beginning to despair.

—Philip Garlick
Calgary, AB

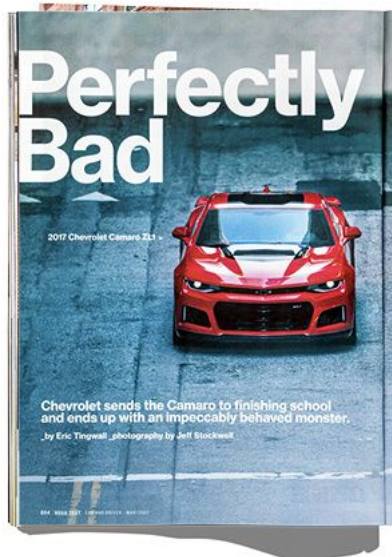
After reading your review of four high-performance sedans, I was reminded of how our differences make life interesting. I came away convinced that the Cadillac won the contest, hands down. Your only substantive quarrel with the car was the sound of its engine. In most other respects, you found the Caddy an admirable high-performance vehicle. The other contenders all had lists of demerits considerably longer, and at first I was perplexed by your final pecking order, with the ATS-V at the tail end of the lineup. In the end, I think you just didn't like the Cadillac but could not come up with any significant logical objections to its behavior and ranked it last anyway. Perhaps it was a matter of pedigree?

—Henry Smith
Sorrento, ME

It had almost nothing to do with dog food—Ed.

I took delivery of my brand-new Austin Yellow M3 complete

“WHAT BUYER OF A TOP-OF-THE-FOOD-CHAIN MUSCLE CAR/TRACK CAR HOPES TO HEAR A SUBDUED, SILKY PURR WHEN THEY MAT THE THROTTLE?”



with the Competition package and dual-clutch transmission 10 days before “A Sports-Sedan Tragi-comedy” comparo hit my mailbox. I agree with most of what you said regarding the M3: It does need a “Hey! I just want to take my wife to dinner” button, and it is too loud. But in many ways it remains the benchmark in comfort and technology, and for it to lose to a car with suspect reliability is fishy. Very fishy.

—Vince Messina
Plymouth, MI

TRANNY SURPRISES

So I'm looking over the spider graph comparing the Chevy Camaro ZL1 [“Perfectly Bad,” March 2017] with others in its class. Hmm. Looks like the ZL1 pretty much dominates the class except for one major weakness, let's see, oh, it's too loud at full throttle?! Wait a second. What buyer of a top-of-the-food-chain muscle car/track car hopes to hear a subdued, silky purr when they mat the throttle? It would make more sense if you would use the sound level at 70-mph cruise. Or better yet use WOT sound level and reverse the bar layout so the higher numbers are at the outside of the graph. Right? Or did BMW bribe you—never mind; of course not.

—Keith Beachy
Martindale, PA

I thought Alfa sent the check this month—Ed.

I was boasting about the new 10-speed

auto in the Camaro ZL1 to my dad (10 quick-shifting gears!), and his first reaction was, “Soon it'll be a CVT.” Which sounds exactly like what GM is trying to achieve with tightly packed ratios: “That keeps the engine closer to its power peak throughout full-throttle acceleration runs.” I guess a CVT-equipped ZL1 isn't too far off.

—Ron
Princeton, NJ

Does the ZL1 come in a driverless version? I'm 63 years old, and that's the only way I'm ever getting into one of those.

—Ron Grelsamer
New York, NY

Regarding the 10-speed automatic in the new ZL1: I would appreciate an explanation as to how it is simultaneously “Mensa-smart” and “wildly inconsistent” when asked to manually downshift. Please reconcile your “wildly inconsistent” and, shall I say, rapidly shifting descriptions. Alternatively, you could manually paddle Mr. Tingwall before he gears up for another article in which he shifts logic and reason, as such things seem to be automatic for him.

—Andrew Tuohy
Trapper Lake, AK

It's smart when left in auto mode. We were annoyed by the manual mode's tap-and-hold feature, which is supposed to downshift to the lowest possible gear. Chevy

has since clarified that the lowest possible gear will only be selected when there is no accelerator input. Future vehicles with the 10-speed automatic will obey the paddles and allow the downshift regardless of accelerator position. End transmission—Ed.

RACING AHEAD

Thanks for “Racing's Little (mostly electric) Secrets,” parentheses mine [March 2017]. Brace yourselves, but combust anything is cave-man behavior! If you disagree, come back and take a look in 10 or 15 years.

The swapping of cams and installing the bigger carbs and exhaust systems of my youth have largely disappeared, and dinosaur-juice-burning vehicles will soon join them in extinction.

Already, folks of the age who do most of the “hopping up” of vehicles are just about completely wired (ha!) into the world of electronics for performance increases. The oil age is ending, and it's good to see C/D getting in line with the future.

—Fred J. Geiger
Santa Cruz, CA

Re: your article on the head-gasket-less Subaru being a first. Ford's Boss 429 had O-rings for head gaskets back in '69. Yeah, they weren't ECU controlled, but still. What'd I win?

—Wade Ronske
Davenport, FL

No one said that Prodrive was first—Ed.



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PIZZA FACE

I understand your test between the Domino's DXP and Mitsubishi Eclipse was mainly a fluff piece not to be taken seriously ["Hot vs. Cheesy," March 2017], but I cannot stand idly by as falsities are strewn about willy-nilly. The issue states several times that the Eclipse was a "GT-R," a trim level that never existed for the third-generation Eclipse. Drum brakes, no side skirts, inline-four. It took me all of two seconds to see it was actually an Eclipse GS. *Car and Driver* should be ashamed of peddling such fake news. SAD.

—Sam
Gig Harbor, WA

What's sad is that you missed the tongue-in-cheek joke. A previous owner had badged it a GT-R, and we went along with it—Ed.

In the '80s, I delivered for Domino's in San Antonio, Texas, while in college. A lot of late nights, and a lot of hopefully hot cheese delivered in and around Fort Sam Houston. Our DXPs of the day were AMC Gremlins, in a predictable Domino's blue. I doubt the Gremlins were reacquired at the end of their service, but they did have a passenger seat!

—Jeffrey G. Wilt
Dallas, TX

LAB RATS

Love your maze on pages 76 and 77 in the March issue ["2016 Honda Pilot Elite"]. It proves the old saying,

"You can't get there from here."

—Jim Alexander
Poulsbo, WA

Regarding the word search: backwards and diagonal?! Those are prison rules!

—Matt Newman
Hillsborough, NJ

LEXICON

Kudos to Lexus for the naturally aspirated V-8 ["For the Love," March 2017]. But why, in all the photos I've seen, does the front end look as if it's crying? Does it look different in person?

—Bob Connell
Lowgap, NC

Yes. It's three-dimensional—Ed.

Ossicones?! Wow, had to look that one up. Such a group of polymaths at *C/D*.

—Bob Fiesser
Highlands Ranch, CO

Ossicones, the word on page 84, ain't in the dictionary.

—Frank
Boston, MA

Time to invest in a new dictionary. Ossicones are horn-like protuberances seen on giraffes and male okapis—Ed.

DRIVIN' AND FLYIN'

The Miata has always needed more power while not losing its lightweight identity. The Flyin' Miata ["Pushing Dope," March 2017] looks to be the factory super-Miata, well, the factory super-MX-5 that Mazda should be producing. I certainly hope you have one of these at the next Lightning Lap. How this thing stacks up

B

against the Corvette, Camaro, Boxster/Cayman, 911, M3, and the AMG C63 coupe is something that needs to be determined.

—Scott Spahr
Lebanon, OH

The review of the Flyin' Miata brings back the concept of the original 289 Shelby Cobra—the small two-seat car with giant power. It's a beautiful little monster for the street to surprise some of the baddest muscle cars out there. It might be a car I would long to own, but its price and weight-to-power ratio puts it right there with the Corvette Z06, and that's a quicker car both to 60 mph and through the quarter-mile. The Miata's actual performance compares to the Camaro ZL1 that is nearly \$17,000 cheaper. I guess this car's limited production numbers bring an exclusivity factor, but for my money and the likely lack of warranty, it needs to be a good \$25,000 cheaper. So, who services the Flyin' Miata? Chevy or Mazda?

—Terry
Monrovia, CA

GET LOST

John Phillips, my favorite writer, was the victim of a good old (sometimes sinister) navigation system ["The road that should not have been taken," March 2017]. I am very familiar with that area in Idaho where he ran afoul, as our summer place is a scant mile from where the GPS sent him off U.S. 20 on the "scenic" Fort Henry Historic Byway. That byway is beautiful in the summer on a good day, not in a snowstorm and mud-soaked.

Many people have lost their lives at the hands of GPS, sending them on the "shortest or fastest way." Glad he made it through to amuse us another day!

—Blaine Hunsaker
Brigham City, UT

John Phillips's article in the March 2017 issue, in which he blindly follows his GPS into the middle of nowhere on what could barely be called a road, shows that people have forgotten a simple rule while driving: Use common sense.

—Jesse Aiken
Ossipee, NH

Every year, rental-car drivers in the rural West turn into poppies in the snow or jerky in the desert because they relied on rental-car GPS without first checking its settings. It's amazing that rental drivers adjust mirrors, etc., but don't check whether the GPS in their rental is set to travel dirt roads. Placing your life in the hands of an unknown GPS system has proven to be a life-ending error.

—Larry Brickner
Las Vegas, NV

As old as John Phillips is, I'm surprised he didn't have some paper maps to help him choose his routes wisely instead of relying on his GPS and "scenic byways." Heck, I'm only 40, and I still use paper maps for sanity checks. The next time he's feeling adventurous, he should make sure he's driving his wife's Toyota FJ Cruiser.

—Marc Ahlen
Albuquerque, NM

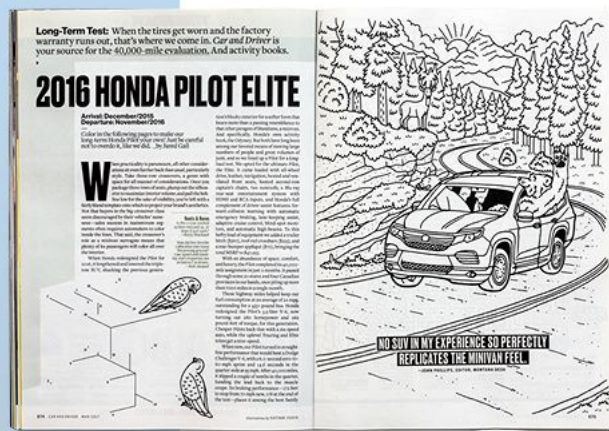
SHOP RATS

After reading Aaron Robinson's column in the March 2017 issue ["Swimming against a current of indifference"], I have to agree with him, but it's nothing new. I attended high school in the mid-'60s. My parents and my school counselor all tried to talk me out of auto shop. While still in high school, I got a job at a Shell gas station and finally convinced my parents to let me take auto shop my senior year. I retired from a 46-year

Letter of the Month:

— If you don't show the solution to the maze on pages 76 and 77 of the March issue ["2016 Honda Pilot Elite"], someone will die. My dad has refused to leave the bathroom until he can get the Pilot to the cottage.

—Jeff Rosenbloom
Rochester, NY



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career working as an auto technician in 2010. I owned my own shop for 25 years, and the last two years were spent at a Lexus dealership as the diagnostic specialist. This country has too many college graduates out of work. We need more technical schools and counselors who will direct kids with the aptitude to those schools!

—Pete Moler
Naperville, IL

EASY E

Ezra Dyer is my spirit animal. I want to hang out with Ezra and in doing so cause a ruckus, raise a bit of hell, be generally obnoxious, unruly, ornery, and maybe even a bit combative.

I read his column with absolute interest as I can relate to his actions and way of thinking ["One man's unnatural desire for a street-legal golf cart," March 2017]. If I had the time, the money, and the opportunity, my life might mirror his in a number of ways. Thank you, Ezra, for letting me, a two-full-time-job-working (delivery man and night bus transit dispatcher) 35-year-old guy in California who drives a 2002 Chevy Tahoe, experience your stories.

—Jerry Phillips
Manteca, CA

Spending \$3400 to come up with a dumb column of less than 1000 words seems like a pretty poor investment. I suspect Dyer gets paid less than \$3.40 per word.

And no funny story how he meat [sic] a

Tesla off the line for the first six feet or so.

—Jason Cutler
Wilton, CT

We'd never steak such a claim—Ed.

What's an Ezra Dyer, and what does he know about my basement?

—Sue
Never Mind Where

The Ezra Dyer represents the cutting edge in basement-mold-remediation technology—Ed.

GRILLING

I might have too many edibles coursing through my system, but the front of the new Lexus LS ["Turning Japanese," March 2017] looks like a perturbed badger with baleen being drawn toward an event horizon. The profile is a mash-up of a Mazda 6 and a Kia Optima. The rims are nice, though... if you were born without eyes. Horrendous.

—Will K.
Denver, CO

Lexus, please, please, enough with that horrid spindle grille already! I don't care how wonderful the rest of the new car is if I can't stand to look at its face. Reading the quote that it took six months to perfect the 5032 facets in the grille makes me think it'll take at least six months to clean the dead bugs out of all the nooks and crevices after a long road trip. What a magnificent pain in the rear that grille will be to keep clean!

—Michael M. Melton
Las Cruces, NM

PERFORMANCE REVIEWS

I just read your entire March 2017 issue, and I have one word to describe it: boring. Come on now, guys. You're the best effing car magazine on the planet. Don't make me read that crap over at *Autocar* or something. Another small-luxury-sedan shootout? The 100th in the last 15 months! Great, what a surprise! The Italians didn't make a car that broke in the first week? Throw a damn parade! Then, within 50 pages, you test essentially the same damn cars in bigger boots by testing a Mercedes E-class on 'roids and a BMW 7-series on Mountain Dew with spokes.

Let me guess what you have lined up for next month: a visit to Jay Leno's garage for more hand-built kitsch, another month where the Upfront section stabs us in the face with boredom instead of it being one of the best sections of the magazine like it used to be, and a test of mid-size sedans because a Toyota Camry carried a camreyo in Cambria. Now please stop sucking and have a super-fabulous day.

With Snark and Love,

—J. W. Hoyt
Columbus, OH

For some reason, I enjoyed the March 2017 C/D more than usual. Keep up the good work.

—Bob Gagnon
La Jolla, CA



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Upfront



001

Reveal of the Month

TRACK RATED

THE JEEP THING THAT JEEP OWNERS WOULDN'T UNDERSTAND. *by Clifford Atiyeh*

ONCE UPON A RECENT TIME, Fiat Chrysler's SRT division slapped a supercharger on a big V-8. The engineers huffed, the marketers puffed, and they blew the garage down with not one, but two production cars packing 707 horsepower and wearing Hellcat badges. Now there's a third vehicle stuffed with the blown 6.2-liter, except it's not a car but an all-wheel-drive Jeep that forgoes the Hellcat label.

Even former Chrysler president Bob Lutz, fighter-jet pilot and father of the Viper, couldn't have foreseen a drag-racing Grand Cherokee when he climbed one up a staircase during the model's 1992 Detroit auto show debut. But things are different now. SUVs are more popular than they were in the '90s, with some offering the acceleration of Porsches (and some, indeed, are actual Porsches). The 2018 Jeep Grand Cherokee Trackhawk will do that, plus top out at a claimed 180 mph. Hey, it's 2017; crazier things have already happened this year.

001
THE TRACKHAWK NEEDS AIR FOR ITS MONSTER ENGINE AND FOR AN OIL COOLER MORE THAN IT NEEDS THE ADDITIONAL LUMENS OF FOG LIGHTS.

▼ POWERTRAIN

The Mercedes-AMG G65 had its moment. For about a year, the 621-hp G65 was the world's most powerful production SUV. The bedazzled German brick house still pumps out more torque, but, at 707, the Trackhawk has 86 more horsepower. It's the same supercharged monster from the Challenger and Charger SRT Hellcats, with a few pieces rearranged to fit in the Jeep's engine bay. In the process, this Hellcat loses five pound-feet of torque to other versions for a total of 645. Since the Hellcat V-8 is a heavy breather—at speed, it inhales more than 1000 cubic feet of air per minute—the SRT guys punched out the fog lights to make intake ducts, one for the passenger's-side oil cooler and the other for the engine air box. All the Hellcat's forged pistons, sodium-filled exhaust valves, and

Who cares which SUV has the most power and torque? Well, Jeep and Mercedes do.

■ TRACKHAWK
□ G65

HORSEPOWER

707 hp
621 hp

TORQUE

645 lb-ft
738 lb-ft

001
AND YOU SHALL
KNOW THE
TRACKHAWK BY
ITS QUAD
TAILPIPIES. THE
NOW TOTALLY
WIMPY REGULAR
GRAND CHEROKEE
SRT HAS BUT HALF
AS MANY.

002
ONLY SMALL
DETAILS, SUCH AS
THE WINGED
TRACKHAWK LOGO
ON THE STEERING-
WHEEL RIM,
DISTINGUISH THE
INTERIOR OF THE
TRACKHAWK
FROM THOSE OF
ITS LESSER
BRETHREN.



001

various hot-rod tricks carry over. The ZF eight-speed automatic incorporates new clutches and updated software, with gearchanges delivered in as little as 160 milliseconds. The gear ratios, including the final drive, are identical to those in the 475-hp Grand Cherokee SRT.

But the parts downstream of the gearbox—the single-speed all-wheel-drive transfer case, the driveshafts, the halfshafts, and the bits that keep them all in place—get reinforced for drag-strip duty. An optimized launch control opens the supercharger's bypass valve and lets the driver set revs between 1500 and 3500 rpm for fast exits. The torque splits remain the same as the SRT's, at 35/65 percent front/rear in sport and 30/70 in track, though the tow mode now divvies it up 60/40 instead of 50/50. SRT engineering head Darryl Smith and his team launched the Trackhawk over “hundreds of runs” and conducted 12 eight-hour lapping sessions to prove the driveline wouldn't lunch on itself.

▼ PERFORMANCE

How about those numbers? Jeep claims a zero-to-60-mph time of 3.5 seconds and a quarter-mile of 11.6 seconds at 116 mph. By comparison, a 2017 Grand Cherokee SRT we tested posted times of 4.4 seconds and 13.0 at 106 mph. The top speed is ungoverned,



002

EXHAUST-PACKAGING CONSTRAINTS MEAN THAT THE TRACKHAWK'S HELLCAT V-8 MAKES FIVE POUND-FEET LESS PEAK TORQUE THAN THE DODGE VERSION. AT 645, THOUGH, IT'S STILL MORE THAN AMPLE.



regardless of whether buyers stick with the 295/45ZR-20 Pirelli Scorpion Verde All Season tires or opt for the summer P Zeros.

Hiding behind the Trackhawk's black-chrome quad exhaust tips are a new muffler, crossover pattern, and resonators that blast Hellcat speed metal at high volume. While SRT opted for active noise cancellation to mute the V-8's low frequencies inside the cabin, Trackhawk development manager Paul Mackiewicz assures us that enough supercharger whine soaks through, and with no fake amplification. "People will definitely know that you're in the Trackhawk when you drive by, and you will, too," he says.

▼ CHASSIS

The Grand Cherokee's rugged, Mercedes-derived chassis can handle the extra 213 pounds that differentiates the Trackhawk from other GCs. This SUV skips over the Grand Cherokee SRT's standard Brembo brakes, instead using two-piece discs with aluminum hats and iron rotors. Six-piston calipers clamp larger 15.7-inch discs up front, while the rears remain 13.8 inches.

The regular SRT's aluminum-intensive suspension gets only minor changes. The independent front and rear geometries carry over, though spring rates are 9 percent and 15 percent stiffer in the front and rear, respectively, and SRT retunes the Bilstein three-mode adaptive dampers. Extra stability comes from the Trackhawk's 1.3-inch-wider front track and 0.1-inch-wider rear track.

▼ STYLING

Like the Land Rover Range Rover Sport SVR, the Porsche Cayenne Turbo S, and other big-shot European SUVs, the Trackhawk tries to be subtle, even tasteful. "This is all about function," says Smith. To that end, a double-vented bulged hood, smoked



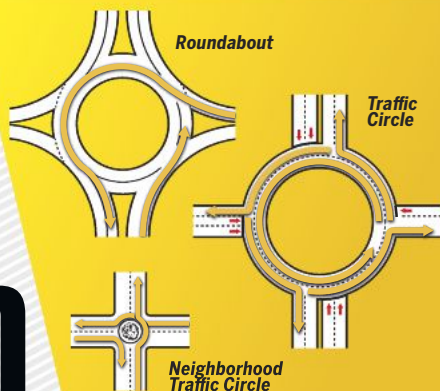
003
WHEN YELLOW BRAKE CALIPERS ARE THE MOST OUTRAGEOUS-LOOKING PART OF A 707-HP BEAST, YOU KNOW JEEP WAS TRYING HARD FOR SUBTLETY.



headlight housings, and four exhaust tips surrounded by a gloss-black valance are the most obvious visual changes from the SRT. Bright-yellow brake calipers contrast with Trackhawk-specific gray wheels, while the optional gloss-black forged wheels save 12 pounds. A few "Supercharged" badges, Trackhawk logos, and two paint colors round out the exterior. Inside, the 200-mph speedometer is a dead giveaway. Several SRT options are standard, including a leather-wrapped dashboard and a 19-speaker Harman/Kardon stereo with two subwoofers.

The price should hover around \$80,000, or nearly a third of the AMG G65's base price, when Jeep dealers clear a spot in their Wrangler-filled showrooms this fall.

DRIVING THROUGH THE SOUND



ANATOMY OF A ROUNDABOUT

•Engineers will argue about its exact definition, but a roundabout, generally speaking, is a circular roadway at an intersection designed to improve traffic flow and reduce accidents. U.S. roundabouts flow counterclockwise.

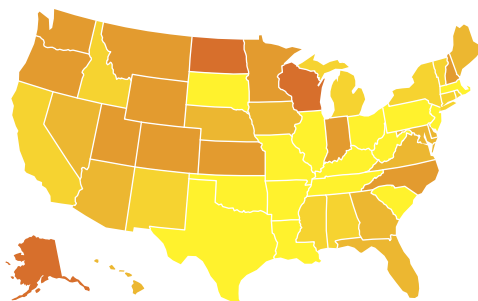
•Roundabouts differ from traditional traffic circles in that entering traffic yields rather than stops at either a sign or a light.

•Roundabouts have a diameter small enough to cause traffic to slow but are larger than a neighborhood traffic circle.

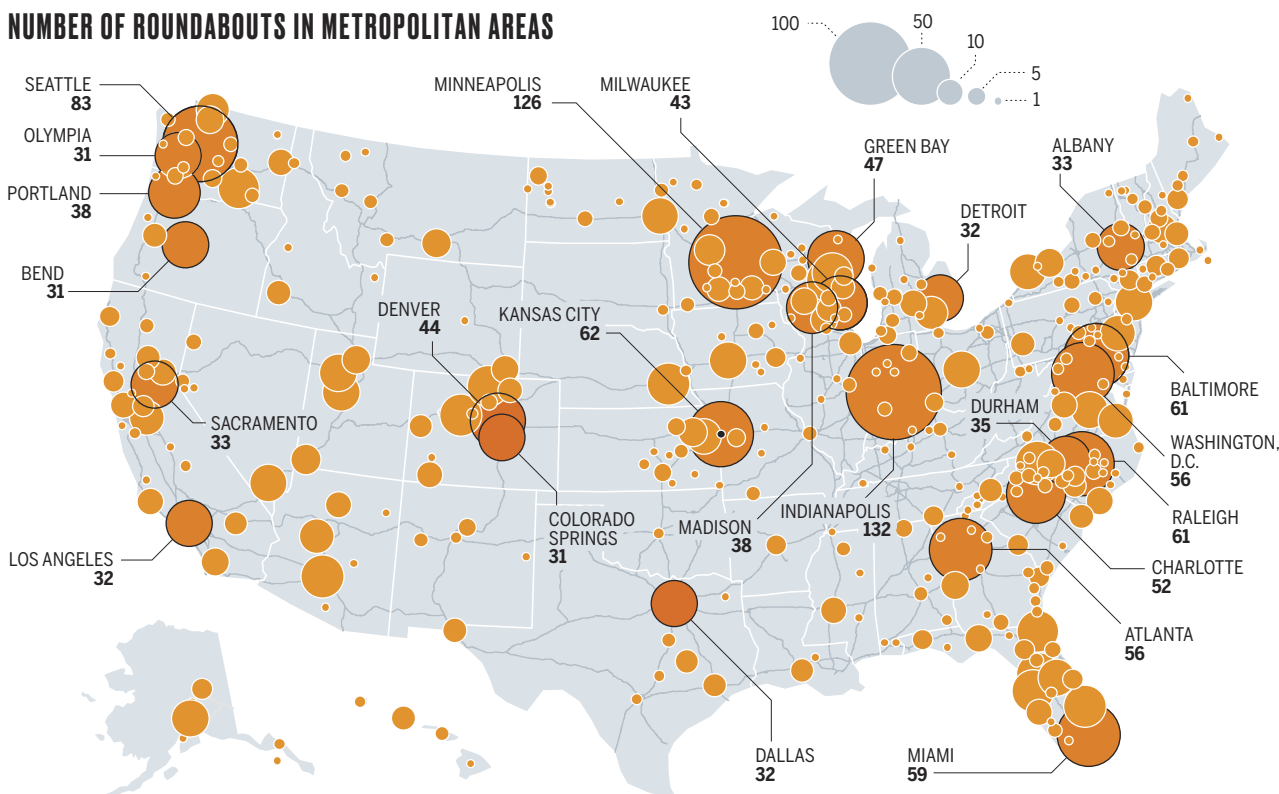
PLOTTING AMERICA'S ROUNDABOUTS. by Jeff Sabatini

IN AND AROUND THE vicinity of C/D headquarters, roundabouts are proliferating. This follows a national trend from the past two decades, particularly between 2005 and 2010. It has also led to an all-too-common phenomenon, in which those who understand the key benefit of these European-style circles—expediting the flow of cars through an intersection—come up on panicked motorists encountering one for the first time, leading to overaggressive application of both brakes and horn. But we can't really blame the rubes for being confused because, in the vast acreage of America, true roundabouts are still relatively scarce. Since road construction is largely localized, roundabouts tend to be concentrated in areas where state or county transportation departments favor them. Areas such as these.

NUMBER OF INHABITANTS FOR EACH ROUNDABOUT



NUMBER OF ROUNDABOUTS IN METROPOLITAN AREAS



Data provided by Kittelson & Associates Inc., population figures by the U.S. Census Bureau.

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DESTINY'S DOZEN

IDENTIFYING THE NEXT GENERATION OF COLLECTOR CARS. *by John Pearley Huffman*



IN THE 1990s, baby boomers deep into their earning years and nostalgic for their imagined youths built up a bull market in GTOs, Mustangs, and 'Cudas. But today, the next generation of collectors—not counting the Ferrari and Porsche folk, who've practically become automotive asset managers—is coalescing around a core of a dozen vehicles that will be the substance of the classic-car market for the next decade or more. Like muscle cars before them, these cars defined high performance, engendering passion and acquisitive lust in a generation of America's young people. These are Gen X vehicles for Gen X collectors, and they're starting up the same appreciation curve that Chevelles have been climbing since the '90s.

Beginning with the assumptions that speed still matters, that four-doors aren't proven collectibles, that limited numbers mean unlimited potential, that originality counts, and that bad-assery never goes out of style, here are 12 machines that will define mainstream collecting for the foreseeable future.

▼ 1997–2001 Acura Integra Type R, \$20,000–\$45,000

The Hemi 'Cuda of sport compacts, most Type Rs have been ruined with bad mods or stolen, recovered, modified, and stolen again. But pristine cars are rocketing upward. "We know the most expensive one that's traded hands was a 1997 with 10,000 miles," says racer Peter Cunningham, who has collected five. "A dealer paid \$43,300 for it on eBay."



▲ 2005–2006 Ford GT, \$200,000–\$500,000

Timeless the very moment it appeared, the GT has never lost value. An '06 Heritage Edition showing five miles went for \$467,500 at Barrett-Jackson's 2016 Palm Beach auction. A good example should be \$250,000, according to the pricing specialists at Black Book.



▲ 1994–1998 Toyota Supra Turbo, \$25,000–\$80,000

It's gaining value fast and furiously, but it's tough to find one that hasn't been butchered. Can't find a set of original wheels? No one else can, either. Black Book has clean 1998 Supra Turbos at \$31,500.



▲ 1993 Ford Mustang SVT Cobra, \$15,000–\$70,000

The run of these ultimate Fox-body Mustangs totaled just 4993 units, and a nice car sold for \$27,500 at Barrett-Jackson's 2016 Scottsdale auction. Prices on eBay are now around \$35,000; Cobra R's run twice that. Black Book places a decent SVT Cobra at \$16,500.

▼ 2011 BMW 1-series M coupe, \$35,000–\$60,000

Only six years old, but they're selling for more than their original MSRP, with some dealers asking \$70,000-plus for primo examples. Its one year of production promises plenty of upsides. Black Book says more-attainable specimens should be around \$42,500.





▲ **2000 Ford Mustang Cobra R**, \$20,000–\$50,000
Ford built only 300 of these lightweight 385-hp Mustangs, and while some saw track duty, many sat pickling in garages. Sellers can ask more than \$50,000, but it seems most preserved cars go closer to \$40,000. Black Book has a nice example going for \$45,000.



▲ **1989 Pontiac Trans Am 20th Anniversary**, \$14,000–\$40,000
Pontiac made only 1555 of these, each with the turbocharged 3.8-liter V-6 from the Buick Grand National. Preserved cars stalled in the \$30,000 range for years, but that price rose to \$37,000 at Mecum's Kissimmee auction this year. Expect a breakout as values pass \$40,000. Black Book has the Turbo T/A at \$22,000.



▲ **1985–1987 Toyota Corolla GT-S (AE86)**, \$3000–\$20,000
Almost all Corolla GT-Ss have had the Initial D brutalized out of them. "There are fewer stock GT-Ss out there than Ferrari Enzos," asserts AE86 owner Ben Hsu, who co-founded JapaneseNostalgicCar.com. Good clean ones will run at least \$15K. "I don't even drive my hatchback. I'm afraid someone will steal it."



▲ **1999–2000 Honda Civic Si**, \$3000–\$7000
While most were ripped apart for stupid modifications, a few un-modded examples are still sitting around at reasonable prices. The last Civic with an unequal-length control-arm front suspension and the only one in the U.S. with the B16 1.6-liter four, it's cheap to collect and destined to rise in value. Black Book lists good examples as low as \$3650.



1988–1991 BMW M3 (E30), \$25,000–\$130,000

Primo early M3s have been dramatically climbing in value. High-mileage cars can still be had cheap, but the nicest examples are beyond \$50K, and preserved Sport Evolution models have blasted off into six figures. Black Book sets the value of a quality first-generation M3 at \$32,500.

▼ 1991–2005 Acura NSX, \$40,000–\$130,000

The sublime NSX is climbing toward its perch. Early cars—easily spotted by their all-black canopies—with high mileage are still in the \$40K range. But a 2003 NSX-T with 8500 on the odo went for \$100,000 at Mecum's 2016 Kissimmee auction. Zanardi-edition cars all seem to be at least \$70,000, and asking prices are getting astronomical. Black Book pegs a nice 2005 NSX-T at \$54,500.



◀ 2011–2015 Cadillac CTS-V coupe, \$24,000–\$50,000

In a crossover world, there doesn't seem to be much future for another coupe like the hugely powerful, dramatically styled, low-production CTS-V. But right now it's a used car with potential—a collecting gamble. Black Book has clean 2011 cars at \$33,200 and nice 2015s at \$53,375.

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VS. 2017 FORD ESCAPE & 2017 HONDA CR-V

<i>Available Safety Feature</i>	<i>'18 Equinox</i>	<i>'17 Escape</i>	<i>'17 CR-V</i>
Surround Vision	YES	NO	NO
Safety Alert Seat	YES	NO	NO
Lane Change Alert	YES	NO	NO
Low Speed Forward Automatic Braking	YES	NO	YES
Rear Park Assist	YES	YES	NO

CHEVROLET





Stuff We Drove in the Office

RUG BURN

THINK OF THE URB-E FOLDING ELECTRIC SCOOTER AS A SEGWAY THAT WON'T STEAL YOUR DIGNITY. *by David Beard*

WITH THE POPULATION DENSITY of the world's largest cities trending upward, Pasadena, California-based URBAN626 is looking to ease the daily commute to the office or public-transportation connector with its URB-E. The electric scooter's lightweight aluminum frame folds up with one pull, providing easy portability and storage when not in use. Since sales started in 2015, URBAN626 has sold about 2700 URB-Es, with the bulk of buyers in coastal cities: New York, Los Angeles, and San Francisco. We rode ours in Ann Arbor. Through the halls of our office, actually.

Pricing for the base URB-E Sport starts at \$899. Like cars, the URB-E is available in various trim levels. At the top is the performance-oriented Pro GT (\$1999). The Pro (\$1699) and the Pro GT feature pneumatic 10-inch tires, a large saddle atop a coil spring to smooth out rough terrain, and a top-spec 50-cell, 36-volt lithium-

URB-E PRO GT

PRICE AS TESTED:

\$1999

BASE PRICE: \$1999

MOTOR TYPE:

permanent magnet synchronous DC, 0.5 hp

BATTERY: air-cooled lithium-ion, 0.4 kWh

TRANSMISSION:

1-speed direct drive

DIMENSIONS

WHEELBASE: 28.5 in

LENGTH: 38.5 in

WIDTH: 19.0 in

HEIGHT: 37.0 in

CURB WEIGHT: 35 lb

C/D TEST RESULTS

ZERO TO

10 MPH: 4.2 sec

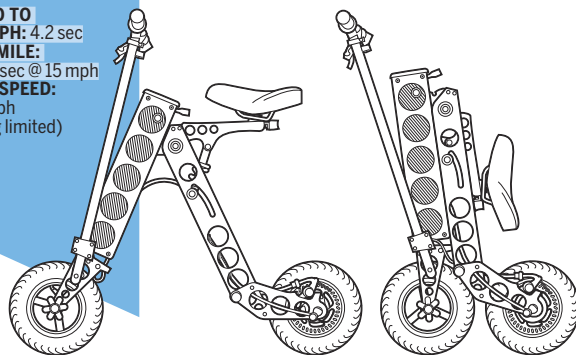
1/4-MILE:

63.8 sec @ 15 mph

TOP SPEED:

15 mph

(drag limited)



ion battery providing electrons to the 0.5-hp motor. Carpet-shredding stopping power is provided by a cable-actuated disc brake on the rear wheel. The GT designates more off-the-line thrust by means of an upgraded motor-control unit. The scooter will wheelie, but even our in-house motocross veteran had trouble finding the balance point on such tiny wheels.

On the road, the URB-E's short 28.5-inch wheelbase makes for twitchy steering, as responses to small inputs are immediate. At a standstill, the carbon-fiber handlebar and stanchion feel flimsy, but over broken concrete they diminish unwanted impacts. Strong headwinds or slight inclines such as handicap-access ramps slow even this most powerful URB-E to a walking pace. At speed, however, the cruiser-style front foot pegs provide some room to stretch out. URBAN626 claims a 20-mile range, but we recorded only 12 miles—with the accelerator mostly pinned to maintain the 15-mph top speed—before folding it up and walking home.

URBAN626 offers a number of accessories for the URB-E, such as lighting, cup-holders, and a speaker system. Also available is a foldable trailer—you know, to pull your spare URB-E for when your primary hog is depleted. An asking price on the heels of quicker, range-topping gasoline-powered scooters is a tough concept to swallow for many of us, but the URB-E would certainly be more welcome than a Honda Ruckus for slalomming through your office cube farm.



MERC-E: AN ELECTRIC BIKE WHEEL SURE TO DENY YOU THE PLEASURE/PAIN OF PEDALING

Pedaling a bike is hard. Because hard things are to be avoided, American electric-bicycle company Evelo offers the Omni Wheel, which adds electric propulsion to nearly any bike. The self-contained wheel, a drop-in replacement, is available in two diameters and in two battery sizes, offering a claimed range between 15 and 40 miles. Prices run from \$999 to \$1249. At 24 pounds, the long-range model nearly doubled the weight of our bike. Pedal assist is optional, or you can configure a thumb-switch accelerator as we did. Setup took about 30 minutes, after which the Omni Wheel provided sufficient yank to pull us around the office at about 15 mph without pedaling, which, mercifully, wasn't very hard. —Josh Jacquot

ILLUSTRATIONS BY PETE SUCHESKI



*CHASE DOWN YOUR PASSION.
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CHRIS BURKARD
ADVENTURE PHOTOGRAPHER

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I live in Montana's Bitterroot Mountains, so please temper what follows with this understanding: It was my choice. With that out of the way, let me just say our 2016–2017 winter felt less like a season than a geological event. It has been one

of Mother Nature's mothers. For the longest time, we had 52 inches of snow on the ground, which meant I could take but one step outdoors before performing a Barney Rubble one-and-a-half gainer. Of course, there wasn't much chance of that, because all my home's entrances/exits were blocked, except for the garage, and it was dodgy, too. As soon as I'd reverse the old Toyota Tundra into the snow, the drifts would jack up the rear end so far that I feared the truck's roof would crush my electric garage door's opening arm. In the Bitterroots, impassable doesn't mean impossible, but it does suggest you consult your local TV listings. Every few minutes.

Of course, this winter has taught me fresh automotive skills. Namely, the installation of tire chains. First of all, top-flight chains are expensive, as in \$170 for the rear set alone. Second, each chain weighs as much as a dorm refrigerator. Third, one of the instructions in the bag warns, "Try to keep your chains dry," which is like telling a judge to avoid legal jargon.

Even buying chains is tricky. The NAPA clerk wouldn't sell me *anything* until she examined the truck and tires herself. She scanned the wheel wells, her forehead all scrunched in concentration, as if she were looking for hidden gems. Then this: "No chains on front. Rears, okay, but install them tight or shit is gonna tear shit up." I

asked for specifics about the shit, and she said, "Tell me this: How fond are you of your brake lines?"

If you've never installed chains before, you should know that it's as much fun as a Grape Nuts enema. All the labor is performed on your hands and knees or on your side. It's like a high-school wrestling match, except snow, mud, and steel are the opponents. You'll need a snowmobile suit or full Carhartts, which you'll have to strip off before sullyng the upholstery, which you unfortunately must do in the middle of this filthy routine so

you can drive the vehicle 18 inches onto the chains. For every chain-up, I go through three sets of gloves as each gets soaked. If you touch the chains barehanded, as I did on a -12 degree Fahrenheit day, you'll never have to worry about FBI identification. Moreover, the Tundra's exhaust is aimed directly at me as I attach the right-side chain, so afterward I must avoid operating heavy machinery, namely the Tundra. On the plus side, when you're all chained up, the vibration may collapse your headliner.

And don't even get me started on the rubber chain tensioners. I installed two six-point tensioners per side and it looked as if someone's trampoline exploded.

I live on a private unpaved road two miles long, sharing it with a half-dozen other recluses with social-adjustment

issues. So this is *our* road, by which I mean it is wholly ours to maintain so it doesn't emigrate elsewhere. We pay a lot of money for this. For instance, when the fire department refused to cross our little railway-car bridge over the 50-foot-wide Tin Cup Creek, we had to replace it with a modern span. Price: \$83,000. Talk about a sucking wound on my Porsche 911 RSR fund.

Our annual road meetings are fraught affairs, with agendas dictated by our three elected Road Czars, one of whom quit in the middle of last week's set-to. We discuss topics that are new to me. Such as issuing clearer instructions to Wes, who drives our commercial Caterpillar grader (chained up, of course), to effect a crisper crown. Such as avoiding windrows (look it up). Such as driving 10 mph, so one's tires don't throw costly surface gravel into the adjoining ditch (we'd enforce this, but the potholes do it for us). Such as filling our 55-gallon barrels with pea gravel and salt and dust-avoidance chemicals and installing guardrails (not gonna happen, because the plow driver then has nowhere to fling snow).

Speaking of guardrails, three of our number have somehow driven over the edge of Lockwood's Hill, where the bears hang out. It's gotta be 100 feet to the bottom, likely more. Our plow driver, Red Shields, told me his first wife took The Plunge: "When I got down there, she was unhurt, and the car hadn't rolled. So I climbed in, started it up, and drove home."

Then there's the business of size, grade, and texture of the crushed stone we buy. This alone has been known to tear Bitterroot families apart. I mean, you've got your #10, called screenings, which is like kitty litter, and your #3 and #4 that are good in soft ice because their sharp edges will offer traction. Our favorite is "3/4 minus," though its size makes it unpleasant to shovel out of barrels. So far, I've repaired two windshields and replaced two others.

In 2013, the American Society of Civil Engineers calculated that by 2020, America's infrastructure will require \$3.6 trillion. For at least two miles of that ragged infrastructure, I believe I have done my part. ■



John Phillips

Oscar Mayer

WE'RE CHANGING
EVERYONE WE MAKE.



HOT DIGGITY DOG!

NOW WITH

NO

ARTIFICIAL
PRESERVATIVES
IN OUR MEAT

NO

ADDED NITRITES
OR NITRATES*

NO

BY-PRODUCTS



FOR THE LOVE OF HOT DOGS.

For reasons lost to history, we once thought dry land looked better than the ocean. Then one day the trees looked better than dry land. In time we got bored with the trees and decided to come down and give dry land another go, but this time walking upright.

That's when it all went to hell for our backs. As my orthopedic surgeon explained, our spines were designed as bridges, to hang suspended like the Golden Gate between our hips and our shoulders. But the day we first rose up erect and faced our future as *Homo sapiens*, the spine became a tower with too much weight on it and not enough support around it. And for many of us, usually right around age 40 when the factory warranty lapses on the machine and the pounds start creeping on, the spine begins its painful slow-motion collapse.

Which is in no way helped by our life with cars. And, in my case, the planes I've flown on to see them and the various computers I've hunched over through the years to write about them. The vertebrae of our spines, and the discs between them that resemble jelly doughnuts and act as shock absorbers, want to align with a nice concave S-shaped curve to the back, just as they do during the yoga cobra pose that I now know so well. However, the bucket seat is no different from the bench seat, seat 34B in coach, or the couch in your living room in the way it bows the spine outward into a convex C-shape, which puts pressure on the weakest discs with their aging, cracked walls of collagen. For those with the wrong genes, the discs respond by



bulging out like squeezed balloons, typically against the large nerves that branch off from our spinal cord and transmit signals from our arms and legs to the brain. Besides plucking these nerves in ways that make our brain's pain receptors light up like a carnival game, the herniated discs also leak their acidic jelly on the nerve sheath, chemically burning it, potentially beyond repair.

Well, as my dad used to say, growing old ain't for sissies. While sofas and airliners are unlikely to change much soon, the auto industry is at least giving some thought to the crumbling tower of bone in our backs. You've heard of the autonomous car? Meet the autonomous car seat.

Ray Scott, president of the seat division for Lear Corp., which last year made the seats for 17 million vehicles, acknowledges that car seats have got to evolve. "Car seats are designed for the first 15 minutes of 'soak time' in the dealership," he told me, referring to the often much-too-brief period during which prospective buyers decide if their favored new car has comfy chairs. However, he says, "the occupants are not being supported over the long run." And what's worse, the buyer often doesn't even know it, having adopted a seating position that seems perfectly comfortable but is actually doing long-term damage.

What happens? Scott and his team, many of whom, coincidentally, have back issues, hired a consultant, Detroit-area chiropractor and disc specialist Dr. Winsen Zouzal, and studied butts in seats to a fare-thee-well, using sophisticated pressure sensors to determine "hot spots" where the spine is misaligned and the backs of the thighs are squeezed. They learned that traditional upmarket adjustments such as power lumbar control are inadequate. These rectangular inflatable "footballs," as Scott calls the pneumatic bags within the seat, often just create pressure points that make you uncomfortable without doing any actual good.

Lear is shopping around a concept that it calls the Intuitive Seat, a sort of living, breathing bucket that is always in motion. The seat can recognize your pressure points and adjusts itself according to your ideal position for spinal alignment, then keeps adjusting and massaging as you fatigue and shift around. Instead of footballs, the Intuitive Seat has what Scott and Zouzal describe as a pneumatic catcher's mitt, or triangular bags that embrace your upper thorax below your shoulders and actually lift it slightly, engaging the core, opening up your airways, and taking pressure off the beleaguered discs below. It gives the driver the option of phasing in the new seat position over time so that you have a chance to get used to what may at first seem like an awkward, upright seat adjustment, and it has sport and comfort settings depending on your driving mood. Scott says a few automakers are interested.

In the meantime, one thing you can do now, according to Scott, is take that wallet out of your back pocket. Sitting on a wallet is terrible for the spine. Also, I suggest investing in a good memory-foam back pillow, which did for me what lumbar adjustment attempts to do: rotate the hips to recurve the spine inward, but in a more distributed way without pressure points.

Our ancestors may have screwed up by coming down from the trees, but don't blame them. They never imagined we'd try to keep our machines going past 40. ■

Aaron Robinson



CARS AND COFFEE



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My garage stinks. Not literally, since I moved the trash can outside, but in the sense that it's thoroughly mediocre. It's neither obsessively neat nor rustically cluttered. There's no theme. It is not a place you'd want to hang out.

Most of the floor space is dominated by the Bronco and the GEM, the rest devoted to tools, spare parts, and kids' toys. The other day I discovered a bird's nest, so at least someone's spending time out there.

I once had a vision of an exquisitely orderly space, walls of memorabilia surrounding gleaming machinery. Indeed, soon after we moved in, I bought a framed Lincoln Versailles poster at a yard sale and hung it on the wall. I imagined it as a kitschy counterpoint to all the cool stuff I'd soon have out there. Five years later, the walls are covered not with signed Dan Gurney photos but with grubby yard tools, shelves of seasonal decorations, and layers of yellow pine pollen. And a Lincoln Versailles poster.

I don't normally spend much time dwelling on my garage inferiority, but every so often I encounter a kick-ass example of outstanding garage-itude that makes me want to rush home and right the wrongs I've inflicted on my two-car den of despair. This happened recently when I stopped to exam-



ine what I thought was a Fiat Jolly parked outside a metal industrial building.

I was driving the new Lexus LC500, the most concept-looking production car I've seen in a long while. The LC gave me confidence to drive onto the fenced property and ogle the microcar—which turned out to be a Subaru 360 with a ragtop—because the LC projects a bravado that asks, “Would you brandish a shotgun at a trespasser whose car contains ever so much Alcantara?” To paraphrase Will Smith in “Parents Just Don't Understand,” would a lunatic drive a Lexus like this?

Indeed, after I was there only a few minutes, the Subaru's owner strolled outside, introduced himself as Billy, and offered a tour.

As it turned out, the metal building, an aircraft hangar, was normally filled with cars, but Billy had moved most of them out so he could have a Mardi Gras party. A bar bedecked with purple tinsel dominated the center of the room, with a smaller bar off to the side made from the front end of a Tata truck. There was a slot machine and a few of those patio heaters you see at fancy restaurants. You know you have a big garage when you use outdoor heaters inside.

Around back, Billy showed me more of his cars, including a Mercury lead sled with a 426 Hemi under the hood. Then he popped open a car transporter to reveal, of all things, a Lexus SC400, the grandpappy of the

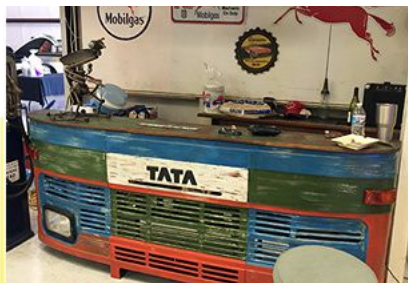
LC500 parked out front. “I bought it for my wife new in 1992,” he said. I didn't figure Billy for a Lexus guy, but then, it's probably hard to draw conclusions about anyone who owns a lead sled, a two-stroke Subaru, and a bar made out of an Indian truck.

We walked around front, where some of Billy's friends were examining the LC. They, too, were serious car guys. One of them builds rat rods, and another showed me photos of the Jaguar E-type into which he's stuffing a supercharged V-8 out of an S-type R. I was fully jealous. I wanted to be Billy's friend. Or at least have a garage that isn't a budding Superfund site.

I know what kind of changes I need to make, based on many covetous observations over the years. First, your garage should not be at your house. Jay Leno's garage is not at his house (and it's also not really a garage, but Jay Leno's Multi-Building Automotive Appreciation Compound is kind of wordy). Adam Carolla's garage is not at his house. And Billy, I'm assuming, does not live at the airport. No, the two-car room attached to your house should merely be an overnight spot for the car you drove home from your garage.

Your ideal garage needs a high ceiling, for lifts. You want couches, a fridge, and maybe even a bathroom. And you want cool cars, but not so many that the space is choked with them. Even one cool car is enough, really. You see, if you park your Cavalier Z24 next to a Corvette in a two-car garage, it's just a strange two-car garage. But park the Cavvie by itself in the middle of the room and it's suddenly much more interesting, because you're making the statement that it should be interesting. Go to the Van Gogh Museum in Amsterdam and you'll see what I'm talking about. They don't have *Sunflowers* crammed in between a carbon-fiber clock and a poster of Catherine Bach. I may have just revealed two other things that I want for my garage.

Procuring an off-site car palace may not be practical any time soon, but I suppose I could at least start improving what I've got. Anybody know where I can get the front end off a Tata? ■



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The 2018 Dodge Challenger SRT Demon is here for one reason alone:



to scorch drag strips.

_by Jared Gall

_photography by Roy Ritchie



QUARTER POUNDER

One hundred fifteen. That's the number of parts in an SRT Hellcat that Dodge changes to make a Demon. Some are made lighter, some are made stronger, and some are simply removed altogether. Compared with the total number of parts that it takes to make a running car, 115 is a small number.

So is 9.65. That's how few seconds Dodge claims the Demon needs to run a quarter-mile, blistering the trap at 140 mph. If we can match that figure—a sizable “if,” since our testing venue better approximates grip levels on the street than the drag strip where Dodge ran its numbers—that will make the Demon the quickest street car we've ever tested. Period. That includes million-dollar hypercars and 1000-hp aftermarket specials. It's also quick enough that an NHRA-sanctioned drag strip will require you to install a roll cage. Indeed, SRT boss Tim Kuniskis is proud of the letter he received from the NHRA telling him his car is banned without one.

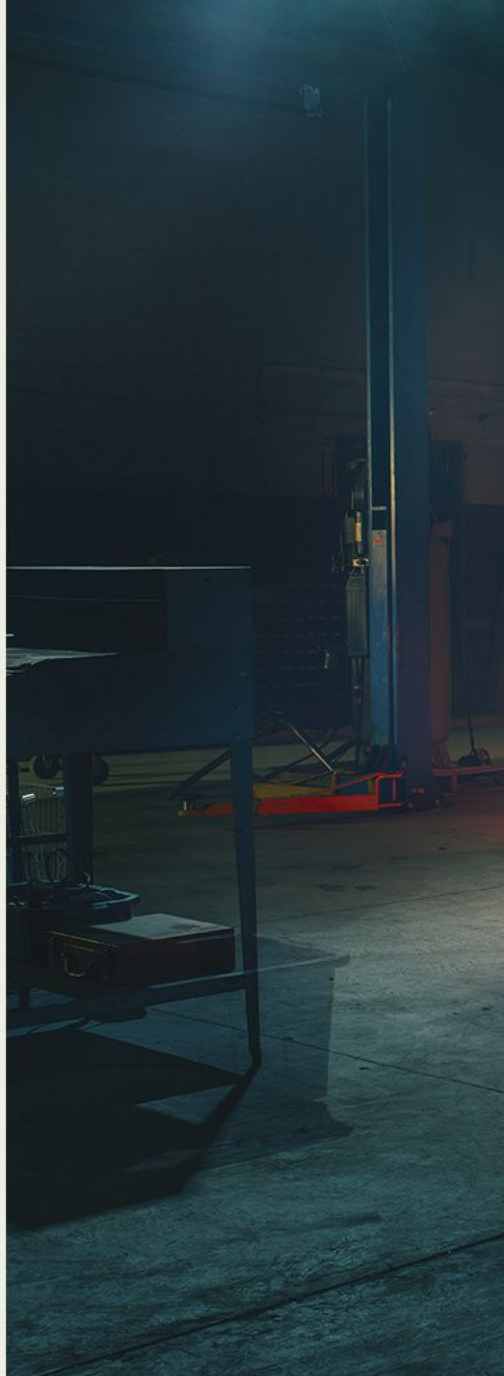
To outrun the rules, the Demon leaves the lights at a claimed 1.8 g's—some 50 percent harder than even the Porsche 918 Spyder—yanking its front wheels off the ground and carrying a wheelie for a few feet on its way past 60 mph just 2.3 seconds into the run. Drag racers will appreciate the 1.36-second 60-foot time; this is unabashedly a numbers car. But the story of those numbers involves a lot more than just a big figure in the horsepower column.

It starts, says Kuniskis, with the Challenger Drag Pak that, like the Chevrolet COPO Camaro and the Ford Mustang Cobra Jet, is a purpose-built drag car. It has no VIN and is not street legal, and it's sold only through dealership parts departments. Says Kuniskis: “They're \$100,000 cars that you've got to put another \$50,000 to \$100,000 into to be really competitive. They're cool cars—they're eight-second cars—but they're very, very limited in their scope.” So, at a time when the consumer versions of the Camaro and Mustang are increasingly pushing into sports-car territory with the ZL1 and GT350, his team seized on the opportunity to do something different. “Everyone else is going sports car,” he says, “so we decided to build the first-ever purpose-built drag car, but with a VIN and a warranty.”

Race cars are stripped down and so, too, is the Demon. Chucking the rear bench saves 55 pounds. The front-passenger chair, with all those levers and gears allowing finicky people to adjust it to their comfort, takes 58 pounds with it as it goes, leaving the driver alone with his thoughts. (Both seats can be added back in as options.) All the speakers are gone, except for two that hang around to sound the seatbelt-warning chime required by law. The associated wiring and simplified head unit account for a 24-pound savings. Yanking the trunk trim saves 20 pounds, and Kuniskis says his team begrudgingly left some sound deadening in the firewall, but chucked it from the rest of the car. “There are a couple pieces we had to leave, but we Swiss-cheesed 'em.” That saved another 18 pounds and makes for a car that he says sounds “wicked.” He adds: “If you don't like the sound of a supercharger, you won't like this car. The thing howls in your ear when you're driving.”

Downsizing the wheels from 20 inches to 18 saved another 16 pounds, as did shrinking the front brakes. Switching to hollow anti-roll bars saves 19. Smaller savings come from ditching the parking sensors and the power tilting/telescoping steering mechanisms (the adjustments are manual now). All told, the Demon is some 215 pounds lighter than a Hellcat.

Launching at 1.8 g's requires an efficient transfer of that lightened load rearward, which means softer springs, noodlier anti-roll bars, and adjustable dampers that behave differently here than in any other car. “Every single adaptive suspension ever made has a baseline,” notes Kuniskis. “And the idea is to take it from the baseline to stiffer, stiffer, stiffer. Street, sport, track,

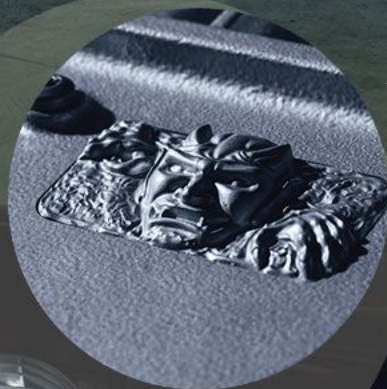


The Demon Crate, available for a nominal fee, is packed with drag-strip goodies to truly unleash the Demon.





Above: The skinny front tires are not exactly "street legal." Left: You mad, bro? Below right: Air is lured into this hole and sent to one of eight fiery hells.





The Demon has a line-lock to hold the front brakes while you warm the rear Nittos with a burnout. Equally important: It can pull a wheelie. A wheelie!

full firm, and the fronts soften completely—so long as the driver keeps the throttle wide open. If the car gets squirrely and the driver backs out of the gas, the fronts firm up to help maintain directional control as load shifts back onto the skinny front tires.

Those tires, known as “runners” in the drag-racing world, are part of a gymnastic loophole squirm Dodge had to perform to get the Demon past its own lawyers. They are not street legal, which is why, when buyers pick up their Demon from the dealership, it will ride on four identical Nitto NT05R drag radials, 315/40R-18 at each corner. The car will come with a voucher that entitles the buyer to purchase a big box called the Demon Crate from the parts department. Its cost is yet to be determined, but Kuniskis is hoping it will be \$1. In it are, among other things, a pair of 4.5-inch-wide wheels along with a jack, Snap-on electric impact wrench, and a torque wrench so the owner can fit them to the car. Critically, though, the crate is sold separately from the car and doesn’t even come with tires. “The wheels don’t come with the car, they’re not on the car, and we don’t even give you the tires,” says Kuniskis. What lawyer could possibly object? And, while the crate is far too large to fit in the Demon, it also contains a foam carrier that nestles into the spare-tire well and has cutouts to transport all the critical bits to and from the track. So yes, those Nittos on the front axle when the Demon grumbles out of the showroom are rear spares.

The drag radials are rated for only 168 mph, which is why the Demon is governed where the less powerful Hellcat is free to run to 199. A Demon logo molded into the sidewall proves the Nittos aren’t off-the-shelf rubber. Near-slicks, they have just enough tread to be

whatever.” But, since drag racers on a budget have been known to drill holes in their front dampers to drain the fluid—facilitating quicker load transfer to the rear on launch—the SRT team tuned the adaptive dampers from the Hellcat to do the modern equivalent. At launch, the rears go

2018 DODGE CHALLENGER SRT DEMON

VEHICLE TYPE: front-engine; rear-wheel-drive; 1-, 2-, 4-, or 5-passenger; 2-door coupe

BASE PRICE: \$85,000 (est)

ENGINE TYPE: supercharged and intercooled pushrod 16-valve V-8, iron block and aluminum heads, port fuel injection

DISPLACEMENT: 376 cu in, 6166 cc

POWER: 808 or 840 hp @ 6300 rpm

TORQUE: 717 or 770 lb-ft @ 4500 rpm

TRANSMISSION: 8-speed automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 116.2 in

LENGTH: 197.5 in

WIDTH: 79.2 in

HEIGHT: 55.7 in

PASSENGER VOLUME:

94 cu ft

TRUNK VOLUME:

16 cu ft

CURB WEIGHT: 4300 lb

PERFORMANCE

(C/D EST)

ZERO TO 60 MPH:

2.3–2.6 sec

ZERO TO 100 MPH:

5.7–5.9 sec

1/4-MILE: 9.8–10.0 sec

TOP SPEED:

168 mph (governed)

FUEL ECONOMY

EPA COMBINED/CITY/

Hwy: 13/10/18 mpg

(C/D est)

street legal, and are designed to run lower pressures to allow the sidewall to wrinkle at launch for that last shred of grip. A devil-tail index mark stamped into the wheels helps ensure that they’re not running too little pressure. Simply make a mark on the tire next to the tail before a pass; if it moves relative to the tail, your wheels are spinning inside the tires and you need to add air.

Wider by 1.7 inches than the rubber on a Hellcat, these tires are the reason for the Demon’s menacing fender flares, which widen the body by 3.5 inches and do much to visually shrink the Challenger. Up front, where they wrap around the fender creases, they seem to pull the hood toward the ground. Out back, they break up the vast acreage of sheetmetal that is the rear-quarters and, coupled with the higher-series slicks on black wheels, add a measure of menace otherwise absent from the Hellcat’s haunches.

There’s more legal sleight-of-hand in the weaponized powerplant, which makes 808 horsepower and 717 pound-feet of torque. But that’s on pump gas. In addition to the wheel-swapping kit, the Demon Crate contains a replacement engine controller that contains programming for race fuel and a new climate-control panel with a 100-octane button. On high-test, the Demon will make 840 horsepower and 770 pound-feet of torque.

Just as “Hellcat” refers both to the car and the engine, so, too, does “Demon.” And while the Hellcat engine has an orange block, the Demon’s is red. Only the block and the heads are shared between the two; Dodge isn’t saying yet how the engine’s internals are fortified, but everything from the crank to the valvetrain has been beefed up to handle the extra output. The supercharger grows from 2.4 to 2.7 liters, with max boost climbing from 11.6 to 14.5 psi.

To meet the airflow needs of such a brute, the Demon gets a new hood with a larger scoop. The Hellcat has had its inner-most driver’s-side headlight hollowed out and ducted into the airbox; the Demon gets that same treatment plus its passenger’s-side light becomes a similar void.

As colder air makes more power, Dodge added what it calls the After-Run Cooler, which runs the fans and pump to keep the coolant circulating, aggressively bringing the intercooler temp back down to ambient. Then the SRT team took it one step further, plugging an additional heat exchanger into the intercooler’s fluid circuit that allows them to use the air conditioner to super-chill the coolant as much as 45 degrees below ambient temperature. “On a muggy 80-degree day,” says Kuniskis, “your car thinks it’s in Alaska.”

A torque-management system cuts fuel to random cylinders and retards the timing when the car is in launch mode, allowing the Demon to spin up its supercharger and stuff the engine full of boost. The staccato soundtrack that results is a bit of bonus drag-strip theater.

Incredibly, the ZF eight-speed in the Demon remains unchanged. It gets a trans brake [see “Explained”] and a higher-stall torque converter that is tweaked for additional torque multiplication, but the gear ratios even carry over from the Hellcat. Everything aft of the transmission is beefed up, though. The driveshaft tubing is 20 percent thicker, the differential gets a higher-strength gearset and a sturdier case, and the half-shafts are fortified. A shorter 3.09:1 final-drive ratio (compared with the Hellcat’s 2.62) better matches the engine speed to the Demon’s single-minded mission of Christmas-tree racing.

To encourage the driver to keep that mission in focus, the Demon also includes a number of new infotainment features. A real-time display of horsepower and torque output will try to distract you as you manage the real-world implications of that output, while a data-recording feature will generate a log of runs. It helps track any performance changes due to anything from shifting weather to new parts. You can adjust your launch-control rpm and handicap your reaction time by customizing the timing of the shift light for each individual gear, or just keep an eye on things with digital gauges for oil pressure and temperature; coolant, trans fluid, intake-air, and intercooler temps; the air-fuel ratio; the supercharger boost; and the battery voltage. Another screen plots the effectiveness of the After-Run Chiller and tells you precisely when the car is ready for another full-power pass. Still others will clock

Easter Eggs, Unscrambled

Dodge’s months-long reveal of the Demon was littered with enigmatic clues to the car’s capabilities. Here’s what the most cryptic of them meant:



#2576@35

Popping a wheelie requires the Demon to transfer 2576 pounds rearward at launch. It carries the front wheels for 35 inches before the nose returns to Earth.



13.5-575@500

A 1.8-g launch equates to 57.5 feet per second squared (575). The Demon hits that mark 0.500 second into the run at 13.5 mph.



VIN TAG: 0757 001121

The 757 is a veiled promise of more than 750 horsepower and 700 pound-feet. November 21 is when the Demon popped its first wheelie and ran that 9.65 quarter.



3.9+221-405

The torque-management system allows the Demon to generate 3.9 pounds of boost at the starting line. That adds 221 pound-feet, for total launch torque of 405.



8.3+317-534

Add in the trans brake, and now the Demon can spin the engine faster before launch, making 8.3 pounds of boost for an extra 317 pound-feet of torque, meaning a total of 534.

your zero-to-60, zero-to-100, and eighth- and quarter-mile times as well as your reaction time against an in-car countdown.

As thorough and as uncompromising a rethink as the Demon is, it won’t be a huge step up in price from the Hellcat. Figure on a base around \$85,000, though dealers shouldn’t have a hard time finding people to pay many tens of thousands more. Dodge will crank out 3000 Demons for U.S. customers and an additional 300 for Canadians. Deliveries begin this fall.

The Demon, while obviously a numbers car, is about something else beyond numbers. It’s about headlines. Kuniskis stresses the importance of the Demon being the ultimate. “If the car ran 10.2 seconds, and it was not banned, and it was not the quickest, that’d be great, but nobody would care because it wasn’t the quickest zero to 60, it wasn’t the quickest quarter-mile, it wasn’t banned, and it didn’t do a wheelie. But when it does all those things, that’s when people go: ‘Wow, what just happened? That Bugatti is supposed to do that, not a Dodge.’” ■

Explained: The Demon’s transmission brake

A trans brake is a common drag-racing device that helps a car launch harder. When activated, it simultaneously engages first and reverse gears, locking the transmission’s input and output shafts and preventing the car from moving. It’s like brake-torquing but removes the risk of doing a burnout or, at the strip, pushing those skinny front tires through the staging lights. It also allows the engine to hold higher revs, which means that the car can launch at precisely the torque converter’s stall speed. In a supercharged car such as the Demon, that also allows the blower to build boost before launch. And since most people’s hands are quicker than their feet, and the driver releases the transmission brake by pulling either shift paddle, it should help reaction times at the strip as well.



Clarity

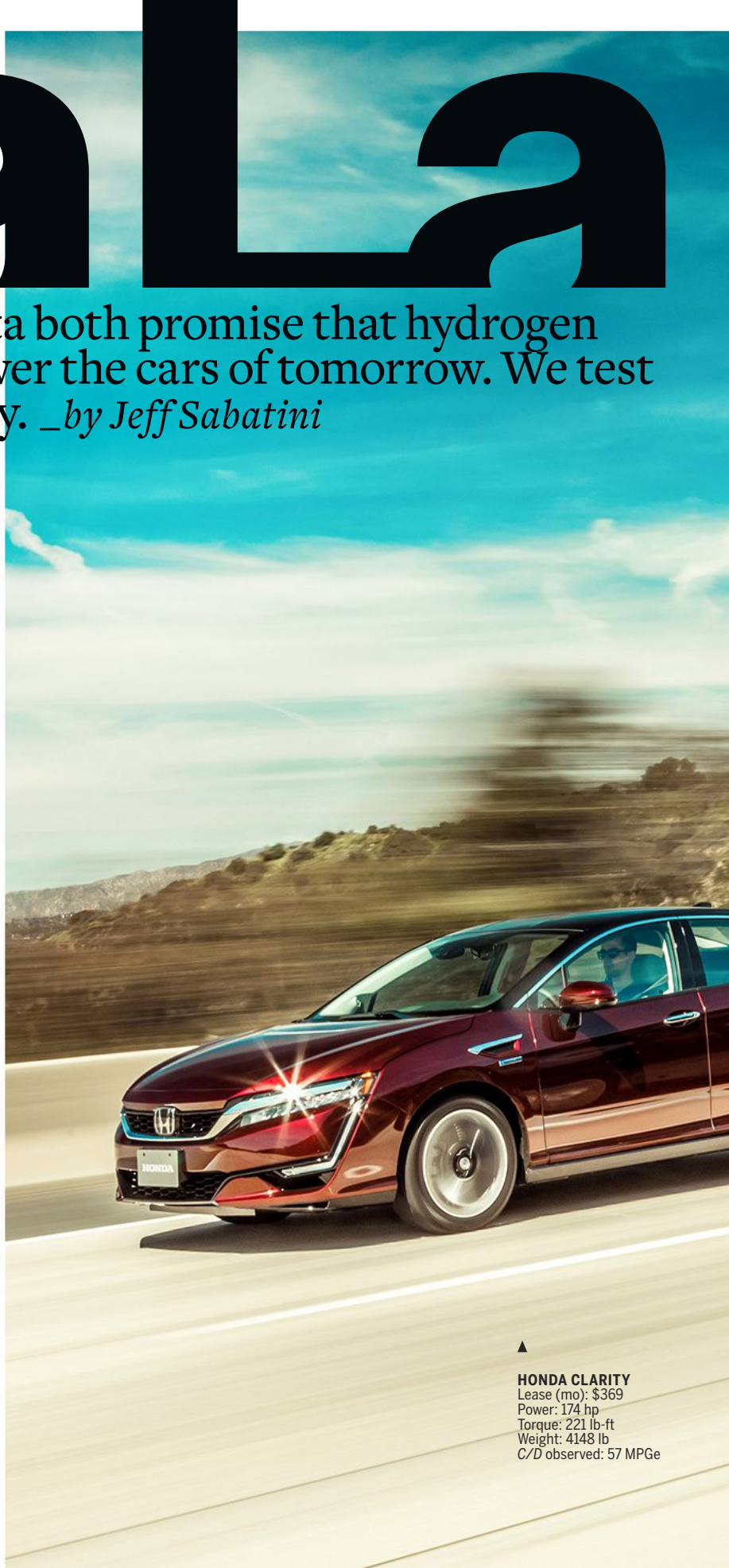
Honda and Toyota both promise that hydrogen fuel cells will power the cars of tomorrow. We test their mettle today. *—by Jeff Sabatini*

This is a fantasy comparison test, but not our usual kind. There is no exotic sheetmetal on display here, no towering horsepower or physics-defying handling. Certainly nobody daydreams about driving 300 miles without leaving Los Angeles. But that's exactly what we did to evaluate the Honda Clarity and Toyota Mirai, tracing a path between each of the area's hydrogen stations to assess the reality of owning one of these fuel-cell-powered cars.

Yes, you read that correctly. No longer does hitching your wagon to the periodic table require leasing a carmaker's science project with a promise to return it, whether or not you're done driving it, at least not if you spend \$58,385 for the Mirai. A federal tax credit expired at the end of last year, but a \$5000 rebate from the state of California still reduces this amount. Even so, goosed lease rates mean most of those traveling the hydrogen highway will remain tenants. Toyota will let you drive a Mirai for \$349 a month for three years, including free hydrogen. A similar deal from Honda runs \$369. Its second-generation Clarity—on sale since December 2016—is lease-only, with a nominal \$59,365 MSRP. The cars are available solely in California.

Certainly these kinds of numbers would make good financial sense for plenty of drivers, especially considering both the Clarity and Mirai are eligible for California's white "clean air" HOV-lane stickers through January 1, 2019. Regardless, Toyota moved just 1034 Mirais in 2016, its first full year on the market, which is less than the number of Camrys it built *per day* last year.

For cars that portend a transportation revolution, these two have rather mundane aspirations. Aside from their powertrains, the engineering is primarily aimed at mimicking the experience of each company's mass-market mid-size sedan, those hundreds of thousands



▲
HONDA CLARITY
Lease (mo): \$369
Power: 174 hp
Torque: 221 lb-ft
Weight: 4148 lb
C/D observed: 57 MPGe

Land

—photography by Marc Urbano



TOYOTA MIRAI

Lease (mo): \$349
Power: 152 hp
Torque: 247 lb-ft
Weight: 4097 lb
C/D observed: 48 MPGe



of gasoline-burning Accords and Camrys that Americans buy every year. And not the V-6 models, but the four-cylinders, as the Clarity and Mirai have similarly modest power specs, their electric motor/generators rated at 174 and 152 horsepower, respectively.

Both are mounted up front to drive the front wheels through single-speed transaxles. Layouts diverge from there, in part because Toyota borrows some of the tech from its hybrid lineup, including the motor, power-control unit, and nickel-metal-hydride battery. Honda locates the fuel cell under the Clarity's hood, while Toyota puts its fuel cell under the Mirai's front seat. This is roughly where the Honda's 1.7-kWh battery resides. Toyota puts a 1.5-kWh battery in the trunk along with the smaller of two hydrogen tanks, with the larger tank stowed under the rear seats. Tank placement is reversed in the Honda. The electric motors that turn the wheels pull current directly from the fuel cells, as well as from the batteries, which get charged both by the fuel cell and through regenerative braking. Both cars measure just less than 193 inches long, almost the same length as their Accord and Camry counterparts.

If neither the Clarity nor the Mirai is conceived to deliver surprises, the budding hydrogen infrastructure is good for a few. We



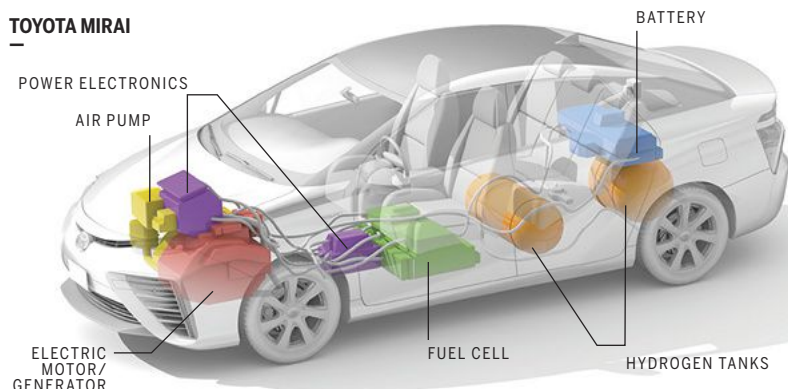
The Mirai is the subject of countless car-designer nightmares. Its interior feels cramped and can seat only four.

found it a breeze to visit every hydrogen pump in the greater Los Angeles sprawl in a day. Most have simply been added to regular gas stations, with on-site hydrogen storage in aboveground tanks the size of studio apartments. Fueling was simple, taking only about five minutes. When we set out on our L.A. tour, however, we found that not all the 15 stations shown on the California Fuel Cell Partnership's online map were pumping hydrogen that day. One was temporarily down for maintenance, while we were told another has been offline for a while due to noise complaints from neighbors. Two more stations were being serviced by technicians when we arrived. We also came across a Shell gas station with hydrogen that was not listed on the map. Fortunately for us, this little outpost in the hydrogen economy was also well stocked with beef jerky.

2. Toyota Mirai

There is a particular type of Angeleno, one born and bred there and thus incapable of

TOYOTA MIRAI





Source: California Fuel Cell Partnership

2016 Toyota Mirai
[+] Good accelerator response.
[–] Less efficient than expected, blindingly unattractive, compromised packaging shrinks the interior.
[=] If it were still 2008, Toyota's fuel-cell car would set a new benchmark for the segment.

leaving this Mecca of numerically named freeways. These are the people who think the Mojave Desert extends all the way to the Midwest, where everyone lives on a farm, and the country beyond is equally divided between New York City and that place where they filmed *Gone with the Wind*. These people do not leave the house when it rains; they get cold when the temperature approaches the freezing point, or somewhere around 68 degrees Fahrenheit; and they have never in their lives driven above 45 mph. They are the likely target market for these cars.

Understanding this, it is easy to see how the Mirai might appeal. It is well suited for the jab and cross necessary to deal with the faltering pulse of L.A. freeways. Punching the accelerator produces a more vigorous initial response than in the Clarity, such that it sometimes surprises you with an embarrassing little squeal of the tires. The

point in the brake-pedal stroke at which the pads begin to grab is easier to recognize and modulate in the Toyota than in the Honda, too. And the Mirai's steering does transmit a small amount of road feel, a sensation absent from the Clarity. But none of this tactility translates into amusement as much as it makes the Mirai feel cheaper than the Clarity, a car so successfully insulated from the sensations of the world that it feels breaded in panko.

With EPA range estimates topping 300 miles, venturing farther afield from L.A. is certainly possible. There are hydrogen stations in San Diego and Santa Barbara. And thanks to a strategically positioned one, some 190 miles north of Hollywood off the I-5 freeway, you can even make it to northern California. Stations there are strung from San Jose to San Francisco to Sacramento, and even out to Lake Tahoe, but that's the end of the line. And you had better be watching the gauges if you're driving the Mirai. It has a smaller tank, and it was noticeably less efficient than the Clarity on our drive, managing just 48 MPGe—9 MPGe off the Honda and well short of its EPA rating of 67.

With an instrument panel and shifter borrowed from the Prius, the Mirai will make many Californians feel at home. But that also means that they'll have paid twice the price for a similar level of

FUEL IT!

California has 26 hydrogen fueling stations, with another 65 scheduled to come online within two years. Most of these are in the Los Angeles area, where a kilogram of hydrogen runs \$10 to \$16, meaning a fill-up in one of these cars could cost more than \$80.

2017 HONDA CLARITY

\$15,783

N/A

2016 TOYOTA MIRAI

\$15,063

\$58,385

THREE-YEAR LEASE PURCHASE PRICE

DIMENSIONS

LENGTH

192.7 in

192.5 in

WIDTH

73.9 in

71.5 in

HEIGHT

58.2 in

60.4 in

WHEELBASE

108.3 in

109.4 in

FRONT TRACK

62.2 in

60.4 in

REAR TRACK

62.5 in

60.8 in

INTERIOR VOLUME

F: 57 cu ft

F: 51 cu ft

R: 45 cu ft

R: 34 cu ft

TRUNK

12 cu ft

13 cu ft

POWERTRAIN

MOTOR TYPE

permanent-magnet synchronous AC, **174 hp**, 221 lb-ft solid polymer electrolyte, 138 hp air-cooled lithium-ion, 1.7 kWh

permanent-magnet synchronous AC, 152 hp, **247 lb-ft** solid polymer electrolyte, 153 hp air-cooled nickel-metal hydride, 1.5 kWh

FUEL CELL

BATTERY

LB PER HP

23.8

27.0

DRIVELINE

TRANSMISSION

1-speed direct drive front

1-speed direct drive front

DRIVEN WHEELS

front

front

OVERALL RATIO:1

9.33

8.78

CHASSIS

SUSPENSION

F: struts, coil springs, anti-roll bar
R: multilink, coil springs, anti-roll bar

F: struts, coil springs, anti-roll bar
R: torsion beam, coil springs

BRAKES

STABILITY CONTROL

TIRES

Michelin Energy Saver A/S
 235/45R-18 94V M+S

F: 11.6-inch vented disc
R: 11.4-inch disc fully defeatable, traction off
 Michelin Primacy MXV4
 215/55R-17 93V M+S



CAR AND DRIVER TEST RESULTS

ACCELERATION

0–30 MPH

3.0 sec

3.0 sec

0–60 MPH

8.1 sec

8.9 sec

0–100 MPH

26.7 sec

31.7 sec

1/4-MILE @ MPH

16.4 sec @ 85

16.9 sec @ 81

ROLLING START,

5–60 MPH

8.3 sec

8.9 sec

TOP GEAR, 30–50 MPH

3.8 sec

4.0 sec

TOP GEAR, 50–70 MPH

5.7 sec

5.8 sec

TOP SPEED

103 mph (gov ltd, mfr's claim)

111 mph (gov ltd, mfr's claim)

CHASSIS

BRAKING, 70–0 MPH

195 ft

189 ft

ROADHOLDING,

300-FT-DIA SKIDPAD

0.79 g

0.76 g

WEIGHT

CURB

4148 lb

4097 lb

%FRONT/%REAR

56.7/43.3

58.2/41.8

FUEL

TANK

EPA COMBINED/

CITY/HWY

C/D 300-MILE TRIP

5.5 kg

5.0 kg

68/69/67 MPGe

67/67/67 MPGe

57 MPGe

48 MPGe

SOUND LEVEL

IDLE

34 dBA

36 dBA

FULL THROTTLE

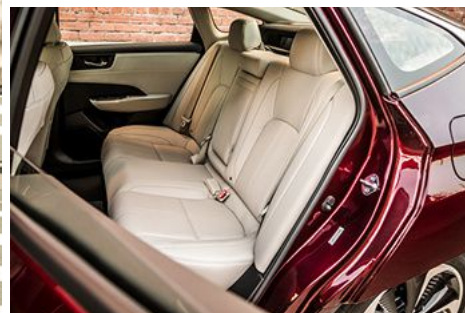
69 dBA

67 dBA

70-MPH CRUISE

66 dBA

67 dBA



interior finish. It's kind of cramped in there, too, at least compared with the Clarity, as the Toyota is 2.4 inches narrower. The Mirai's cell-and-tank packaging also works against it, raising the seating position and making the cabin feel less mid-size and more like a compact. Its small rear seat is only for two, which just exacerbates the "oh what a feeling" that you're in a Corolla.

There is one pissing match the Toyota wins. Located to the left of the steering wheel is a button labeled H₂O. It forces the Mirai to evacuate its exhaust system, which, according to the owner's manual, is useful for leaving the ensuing puddle of water outside the garage before you park. Take that, Honda! As this unique (and also a bit silly) feature uses the same plastic button in the selfsame dashboard hole that the company uses in all manner of vehicles, it also calls attention to the Mirai's biggest disappointment: its Toyota-ness, which makes what could and should be a special car altogether too common.

1. Honda Clarity

At night, if you stand back far enough, and you've had a few drinks, from some angles the Clarity looks almost elegant. In the harsh light of day, however, its profile calls to mind a Citroën CX that's melted under the Orange



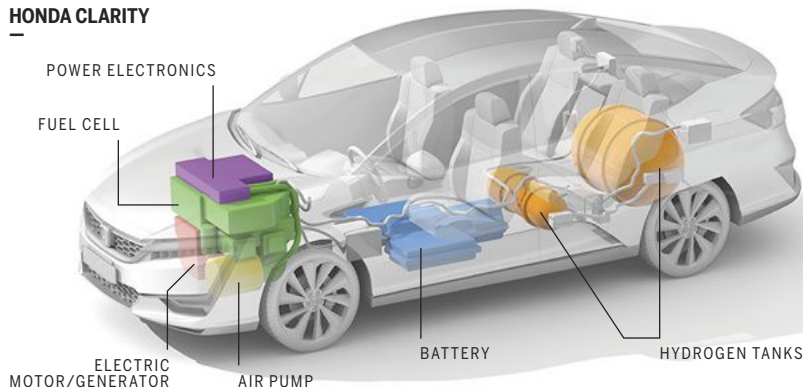
The Clarity's interior quality bodes well for future Hondas, including the electric and hybrid versions of this car.

County sun. If the Honda is still less scorching to the eyeballs than the Toyota, that's because the Mirai simply must be considered among the worst-looking cars of all time. It's right up there with the Pontiac Aztek and the Daimler SP250, a pair that seems to have provided styling inspiration for the Mirai's slab sides and puckered face.

Honda's step backward in exterior design is offset by progress everywhere else. That this is the second generation of the company's fuel-cell sedan is obvious in nearly every point-to-point comparison with the Toyota. For instance, Honda thought to integrate the locations of hydrogen stations into its nav unit, rather than requiring the driver to run an app on a smartphone, as the Toyota does.

The Clarity actually feels almost worthy of its luxury-car price tag, with a high level of refinement throughout. It is well appointed inside, with enough faux open-pore wood and imitation suede that it's nicer than not only the Mirai, but also any other Honda product. The Clarity is also

HONDA CLARITY





FINAL RESULTS

Shell
V-Power
NITRO+
Premium Gasoline
The Official Fuel of
CAR AND DRIVER

	Maximum points available	
	HONDA CLARITY	TOYOTA MIRAI
RANK	1	2
VEHICLE		
DRIVER COMFORT	10	9
ERGONOMICS	10	8
REAR-SEAT COMFORT	5	5
REAR-SEAT SPACE*	5	2
TRUNK SPACE*	5	5
FEATURES/AMENITIES*	10	8
FIT AND FINISH	10	7
INTERIOR STYLING	10	9
EXTERIOR STYLING	10	5
REBATES/EXTRAS*	5	2
AS-TESTED PRICE*	20	19
SUBTOTAL	100	68
POWERTRAIN		
1/4-MILE ACCELERATION*	20	18
FLEXIBILITY*	5	5
FUEL ECONOMY*	10	5
ENGINE NVH	10	8
SUBTOTAL	45	36
CHASSIS		
PERFORMANCE*	20	19
STEERING FEEL	10	7
BRAKE FEEL	10	8
HANDLING	10	6
RIDE	10	7
SUBTOTAL	60	47
EXPERIENCE		
FUN TO DRIVE	25	17
TOTAL	230	164

extremely quiet, especially when stopped in traffic, with only the faintest whirring sounds drifting into the cabin. Its three-passenger back seat feels cavernous compared with the Mirai's.

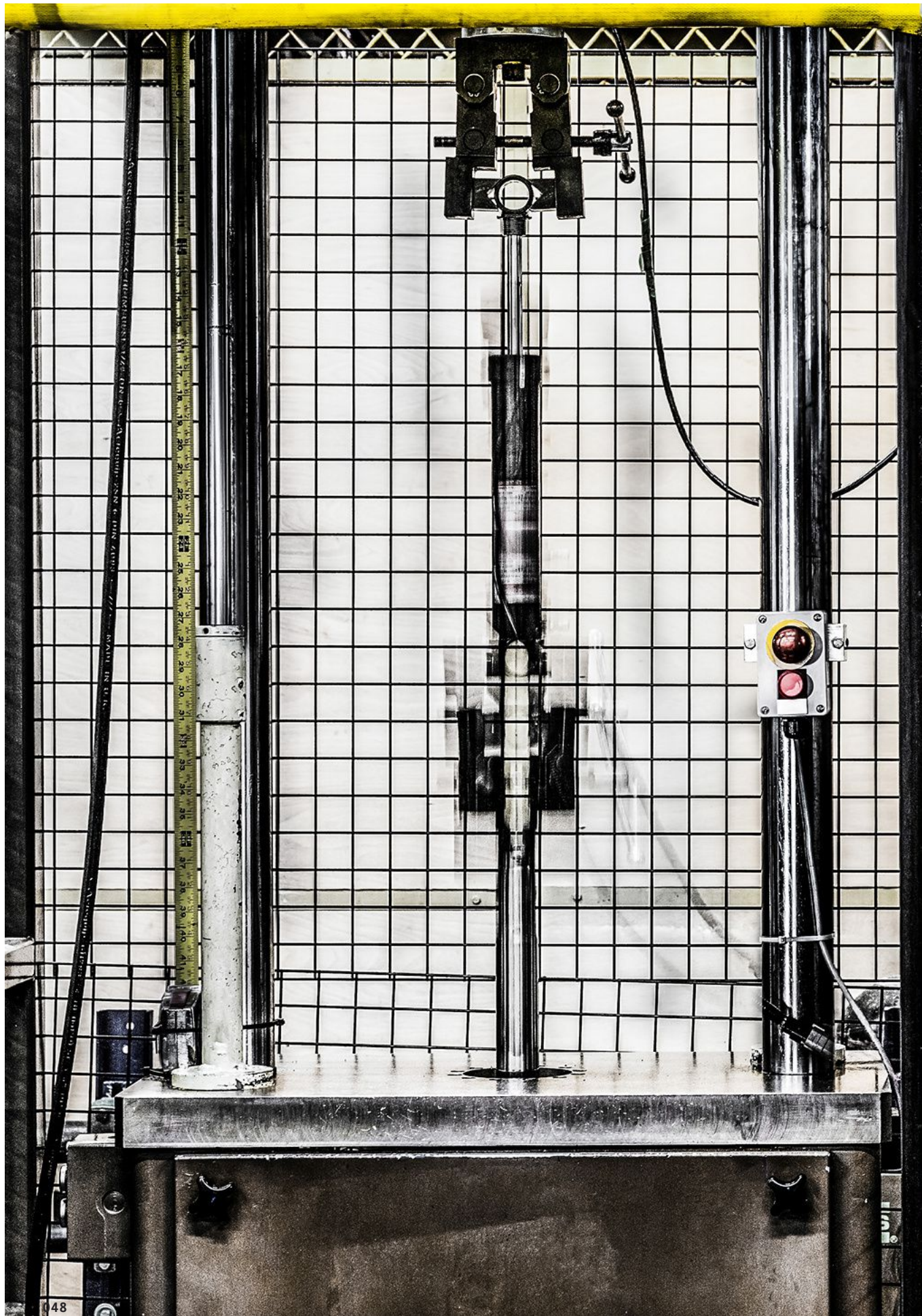
Both of these cars are heavy, topping two tons, but only the Clarity manages its weight with any grace. Its wider tires on larger wheels postpone the inevitable understeer only briefly compared with the Mirai, but the Honda is much better composed and its ride is far more comfortable. The Mirai is tuned so softly that when pushed even moderately it will bounce into the limits of its suspension travel. The Clarity soaks up the road with an effortlessness that's sophisticated but never fun, as evidenced by its low skidpad grip of 0.79 g.

Indeed, its track numbers are unimpressive, even if they are, for the most part, better than the Mirai's. The Clarity's zero-to-60-mph time of 8.1 seconds undercuts

2017 Honda Clarity
[+] **Classy interior, sublime ride, a true five-passenger sedan.**
[-] **Neither pretty nor fun to drive, slower than it should be.**
[=] **In a field of two, the clear victor.**

the Toyota's by eight-tenths, but it's still a half-second slower than a four-cylinder Accord with a continuously variable transmission. Honda limits the Clarity's initial off-the-line torque so you never get that neck-snapping feeling of acceleration that's common in many electric vehicles, even those with less-powerful motors. And even in the dubiously named sport mode, the level of regenerative braking is low, so one-pedal driving is no more possible than making time through the Sepulveda Pass during rush hour.

The Clarity was the obvious victor here, but at the end of our drive we were scratching our heads as if it were the day after the Oscars. These cars prove out the technology, and for a low-cost California transportation appliance, a subsidized lease on one with free fuel would certainly get nominated. But if this hydrogen thing is going to catch on in the real world, the cars themselves will need to be more fantastic. ■



Absorbing It All // The Black Art of Suspension Tuning //

PHOTOGRAPHY BY ANDI HEDRICK //

A car's suspension exists to isolate. Its springs, dampers, and bushings cushion the blows of road imperfections and separate wheel movements from body motions. Yet the best chassis engineers know that suspension tuning is as much about creating a feedback loop among driver, car, and road as it is dialing in the right amount of squish for a pothole strike. Finding that sweet spot in ride quality and handling balance isn't easy, and so the difference between a good car and a great one often comes down to the very human craft of suspension tuning. Mastering this black art requires broad experience, deep knowledge, the right philosophy, and a finely calibrated inner ear (and backside). Here we reveal the processes, the technologies, and the tradecraft used by those who practice the art at the highest level.

// The Squeeze

This damper dyno, in use at auto-supplier Tenneco's Michigan lab, reveals the force-versus-speed curve of a damper, one of the key attributes that define how your car rides and handles.

1. Mapping It Out

// To measure chassis behavior, you need a yardstick that costs as much as a Bugatti. //

BY ERIC TINGWALL

ILLUSTRATION BY BRYAN CHRISTIE DESIGN //
PHOTOGRAPHY BY ANDI HEDRICK

There is no such thing as a clean-sheet vehicle design in 2017. In its relatively brief existence, the automobile illustrates Darwin's natural-selection theory better than the platypus, which has persisted—mostly inexplicably—for somewhere between 19 million and 48 million years. Unlike a duck-billed, beaver-tailed, egg-laying mammal, every modern vehicle is an adaptation of intelligent designs, most of which strengthen the breed and are logically passed down through the generations—in this case, through university lecture halls, technical papers, and CAD files.

Suspension tuning is no exception. Chassis engineers start with proven concepts and aim to improve on those ideas. Put plainly, they benchmark. They measure and analyze the outgoing model and the competitors, and when ambitions grow large, automakers occasionally end up buying \$90,000 rear-engined German sports cars to advance the development of a Ford Mustang.

It's not enough to recognize dynamic excellence, though. Chassis engineers seek attributes that are tangible in the real world, such as chassis feedback, better ride quality, and predictable, manageable behaviors at the limit. But they operate in the deeply nerdy world of spring rates and tire compounds and suspension geometry, where everything interacts and nothing can be gained without compromise. To translate between the two—to trace vehicle behaviors back to the tuning knobs at their disposal—engineers need to find the correlations. Why does

this car feel so natural when driven over that bump at that speed? They often pinpoint the answer using a kinematics-and-compliance (K&C) machine, the yardstick for a science where suspension compression is measured in thousandths of an inch and body roll in fractions of a degree.

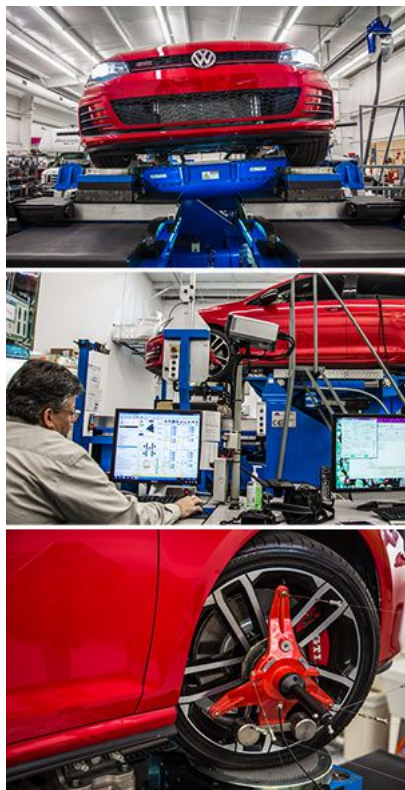
A K&C machine simulates suspension events in a controlled environment where the vehicle's reactions can be precisely measured. An electrically actuated table clamped to the car's pinch seams can pull the body down onto the suspension's bump stops or lift it until the wheels droop, as if it's gone airborne. Ever seen a car corner at 1.00 g while it's sitting still? A K&C machine does just that.

It is not a shaker rig; a K&C machine moves in slow motion. Its occasional hisses and electric hums would hardly raise an eyebrow in a library. A web of taut wires ties to each wheel as if it were a marionette, measuring slight movements in every plane and axis.

A K&C machine's dozens of tests fall into two categories, classified as either (surprise!) kinematics or compliance. Kinematics, the study of motion in the absence of the forces that cause those motions, measures the effects of the suspension geometry alone. Compliance tests determine how cornering, braking, and acceleration forces cause the suspension to deflect. These stiffness measurements reflect the deformation of the bushings, the suspension members, their mounts, and other components.

This chassis-development tool plays a role beyond benchmarking as well. Gene Martindale, who spent 14 years as a dynamics engineer working on Ford performance vehicles, describes one of the K&C's many uses in suspension tuning: "Maybe the car isn't handling right and we think there's something going on with the front suspension. We aren't quite sure what it is when we're driving the car, so we'll go on the K&C machine, stroke the car through its travel, load it in the different directions, and see if we can find an unexpected kinematic or compliance event."

To better illustrate the idea, we conducted our own K&C benchmarking session with two cars that would top our bogey list for a daily driver at any price: a Volkswagen Golf and a GTI. Both hatches combine a strut front suspension, a multi-link rear, solid-mounted subframes, and, as equipped, 18-inch wheels. They are both tidy, affordable transportation with big capabilities, riding with the composure of more expensive vehicles and proffering earnest handling. Never snappy or excessively stiff, they are both livable and lively.



A K&C rig takes all the drama out of limit handling. There will be no Facebook while you wait. That computer isn't even connected to the internet.

We mounted the cars on Morse Measurements' AB Dynamics SPMM 4000 in Salisbury, North Carolina—it's either this \$3 million contraption or a Bugatti Chiron—and spent two afternoons watching the VWs compress, rebound, roll, squat, and dive at glacial speeds on the rig.

The K&C machine puts numbers to the blindingly obvious, such as the fact that the GTI is firmer than its less athletic brother. Compared with the Golf, the GTI's wheel rates (a measure of vertical stiffness that includes both the coil springs and the tire sidewalls) are 28 and 33 percent stiffer, front to rear. The surprises are that the GTI's front toe and camber behavior actually move in the direction of more understeer and less grip. This isn't to say that the GTI understeers more or offers less grip than a Golf. Those handling behaviors are dependent on other factors, such as tires, roll stiffness, and a host of other variables. We attribute these differences between the two platform-mates to the fact that the GTI's body sits 0.6 inch lower, reorienting the suspension links that define the relationship between the body and the wheels.

For our money, we'll still take the GTI and the Bugatti. The engineers can keep their K&C machine.

K&C FINDINGS

// Bump Steer

Toe alignment is the angle a tire is pointed relative to the centerline of the vehicle. It's normally a static measurement, but toe changes as suspensions are loaded. Significant toe change due to bumps or body roll is generally undesirable, as it can cause the vehicle to wander and follow longitudinal imperfections in the pavement. The GTI's front suspension develops slightly more toe out under compression and roll than the Golf. Broadly speaking, this invites more understeer, but toe changes of this magnitude play only a minor role in determining lateral grip compared with factors such as camber, tire compounds, and roll rates.

Toe Out in Compression

Golf
Left Front 0.12 deg/in
Right Front 0.17 deg/in

GTI
Left Front 0.20 deg/in
Right Front 0.21 deg/in

// Lateral Stiffness

The side-to-side stiffness of the suspension and the relative balance front to rear of that stiffness define how a car reacts to steering inputs and lateral forces. Compliance aids grip on broken surfaces, so setting up the rear to be softer than the front end prevents a midcorner disturbance from exciting sudden oversteer. The GTI's greater stiffness as measured at the tire contact patch most likely stems from its use of summer tires and firmer bushings.

Lateral Stiffness

Golf
Front 1005 lb/in
Rear 937 lb/in

GTI
Front 1266 lb/in
Rear 1098 lb/in

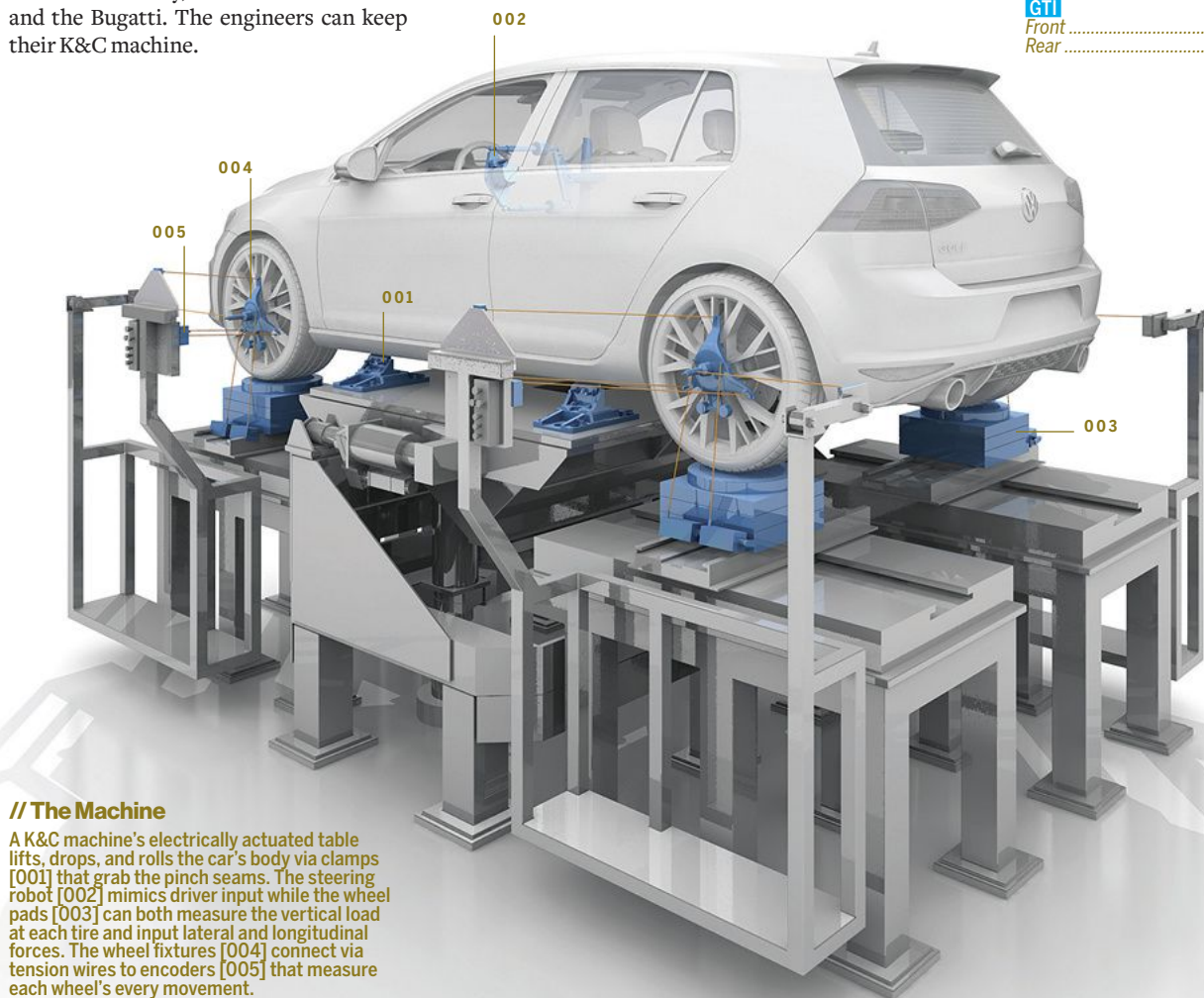
// Camber Recovery

Camber angle is the angle of the wheel relative to vertical as viewed from the front or rear. As a vehicle corners, the outside wheels lean into positive camber (the top of the wheel tips outward), lifting a portion of the contact patch off the pavement and reducing lateral grip. To counter this, chassis engineers design the suspension to add negative camber as it compresses. Camber recovery is the amount of this correction as a percentage of body roll. With 100 percent camber recovery, two degrees of body roll would be compensated for by two degrees of negative camber gain, but in practice, road cars never achieve this level of compensation. The GTI's lower front-axle camber recovery compared with the Golf's is less desirable. It's likely the result of lowering the suspension, combined with the limits of camber control inherent in all strut-suspension designs.

Camber Recovery

Golf
Front 18%
Rear 19%

GTI
Front 15%
Rear 20%

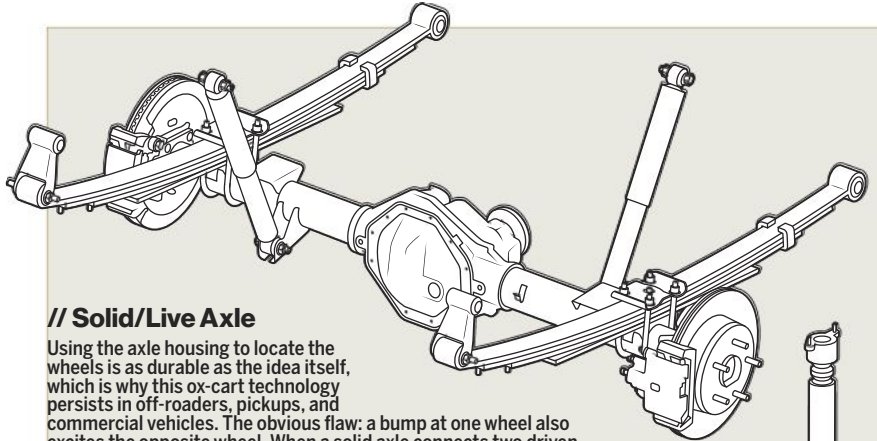


// The Machine

A K&C machine's electrically actuated table lifts, drops, and rolls the car's body via clamps [001] that grab the pinch seams. The steering robot [002] mimics driver input while the wheel pads [003] can both measure the vertical load at each tire and input lateral and longitudinal forces. The wheel fixtures [004] connect via tension wires to encoders [005] that measure each wheel's every movement.

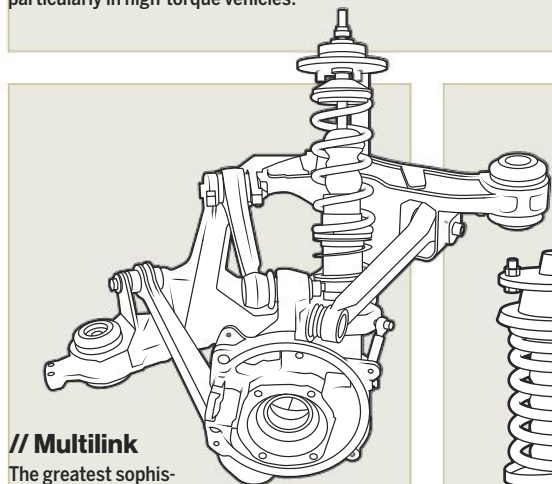
2. Applying Geometry

// How, you may wonder, do dynamics engineers determine what kind of hardware to use in a suspension? Here's the short version: Other people tell them. Engineers must work within the constraints of the basic suspension arrangement dictated by packaging requirements, budget, and the vehicle architecture. But there's plenty of tweaking to be done: After collecting benchmark data from the kinematics-and-compliance machine, engineers define a set of K&C targets for their car. They then collaborate with suspension designers to create front and rear geometries that mimic those attributes, altering mounting points, bushing stiffness, link and arm design, and other variables. Here are the five most common suspension configurations found in today's vehicles:



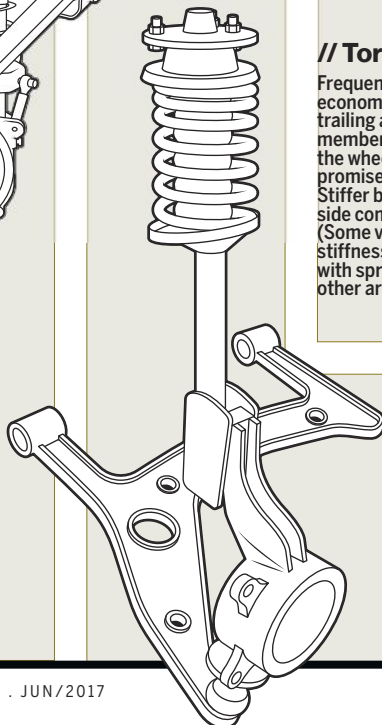
// Solid/Live Axle

Using the axle housing to locate the wheels is as durable as the idea itself, which is why this ox-cart technology persists in off-roaders, pickups, and commercial vehicles. The obvious flaw: a bump at one wheel also excites the opposite wheel. When a solid axle connects two driven wheels—also known as a “live axle”—the axle shafts, differential, and housing all contribute to unsprung weight, affecting ride quality and aggravating axle hop under acceleration and braking, particularly in high-torque vehicles.



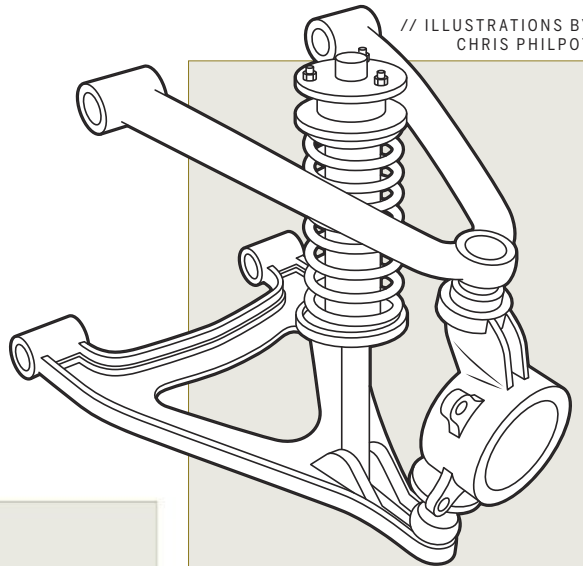
// Multilink

The greatest sophistication and tuning flexibility comes from using a combination of links and arms, or just five individual links. One common arrangement includes three lateral links for side-to-side wheel location, one longitudinal link for fore-aft restraint, and a toe-control link that effectively makes minute steering adjustments as the suspension strokes. The multilink approach allows for higher lateral stiffness and the desired toe change with appropriate vertical and longitudinal compliance. Multilink setups can also be designed to better resist dive and squat under braking and acceleration, respectively. Put simply, multilink suspensions offer the most separation between handling and ride-quality attributes to reduce compromises.



// Strut

In this, the most popular front-suspension setup, a beefed-up damper (typically with a concentric coil spring) serves double duty, acting as a locating device while calming vertical movement. Strut configurations are commonly chosen for their simplicity and cost, and they're narrower than control-arm and multilink arrangements, making them ideal for transverse-engine cars. However, the strut design limits an engineer's options to optimize camber as the wheel moves vertically.

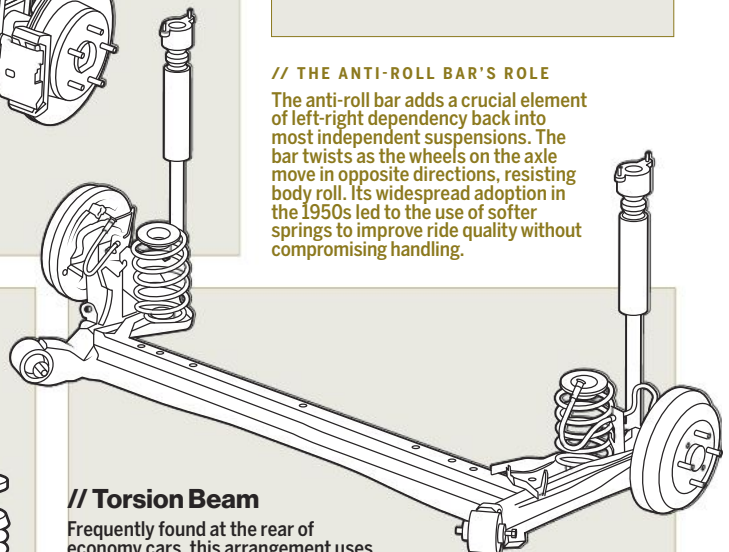


// Control Arms

A pair of lateral arms, sometimes called double wishbones or A-arms, offers better control over the kinematics than a strut-type arrangement. Among the benefits: an upper arm that's shorter than the lower arm to optimize the orientation of the tire contact patch as the body rolls, increasing lateral grip. Control arms also require less height than a strut suspension—the better to slip under the low hoods of sports cars such as the Acura NSX and the Chevrolet Corvette.

// THE ANTI-ROLL BAR'S ROLE

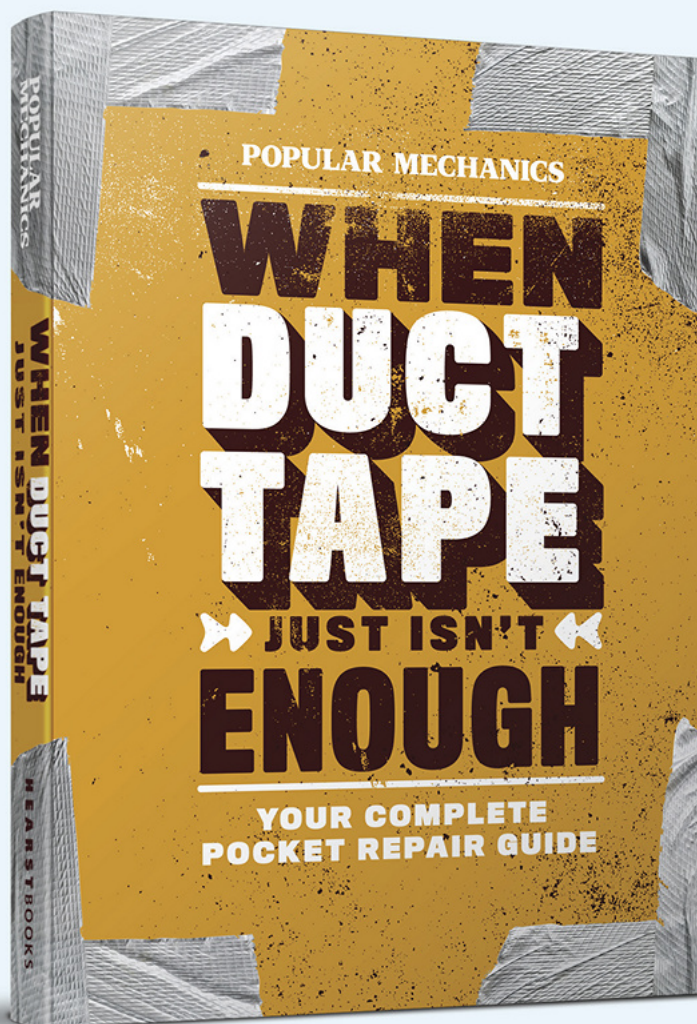
The anti-roll bar adds a crucial element of left-right dependency back into most independent suspensions. The bar twists as the wheels on the axle move in opposite directions, resisting body roll. Its widespread adoption in the 1950s led to the use of softer springs to improve ride quality without compromising handling.



// Torsion Beam

Frequently found at the rear of economy cars, this arrangement uses trailing arms integrated with a cross-member that is designed to twist as the wheels move. While the torsion beam or “twist beam” isn't as compromised as a solid axle, neither is it a truly independent suspension. Stiffer bushings can compensate for the torsion beam's inherent side-to-side compliance, but that comes with a toll of greater impact harshness. (Some vehicles use a Watt's linkage or a Panhard rod to improve lateral stiffness without compromising ride quality.) Low mounting points along with springs and dampers that are mounted farther outboard than in other arrangements create more interior and cargo space.

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HEARST BOOKS

3. Putting a Damper on It

// They are largely responsible for determining a car's driving character, so choosing the right damper matters. //

BY JOSH JACQUOT

ILLUSTRATIONS BY CHRIS PHILPOT //
PHOTOGRAPHY BY ANDI HEDRICK

First, they're called dampers, not shocks. And dampers, as any suspension engineer will tell you, get no respect. In fact, considered against the noisier, flashier, and more easily seen components of the automobile, these inconspicuous components may be the most underappreciated pieces on a car. Their job—keeping the tires on the ground to accelerate, brake, and turn, while making the ride livable—is rather important. And though damper calibration is one of the last elements to be finalized in suspension tuning, it's the part that endows a chassis with its personality. Here's a breakdown of the most popular varieties:

COLOR KEY
FOR DAMPER
SECTION:

■ OIL
■ NITROGEN
■ SPECIAL
FEATURE

// Monotube Damper

Found in: Audi A4, Mazda MX-5 Miata
This design uses a single cylinder split by a floating divider into oil and gas chambers. A shaft pushes the piston in the cylinder to create damping force. During compression, oil is metered through a shim stack on the shaft side of the piston. In rebound, shim stacks on the face of the piston control flow. Gas (often nitrogen) in the chamber is squeezed during compression to compensate for the oil displaced by the shaft. Damping force is determined by the shape, size, and number of shims on the piston, the shaft diameter, the cylinder diameter, and gas pressure.

// Twin-Tube Damper

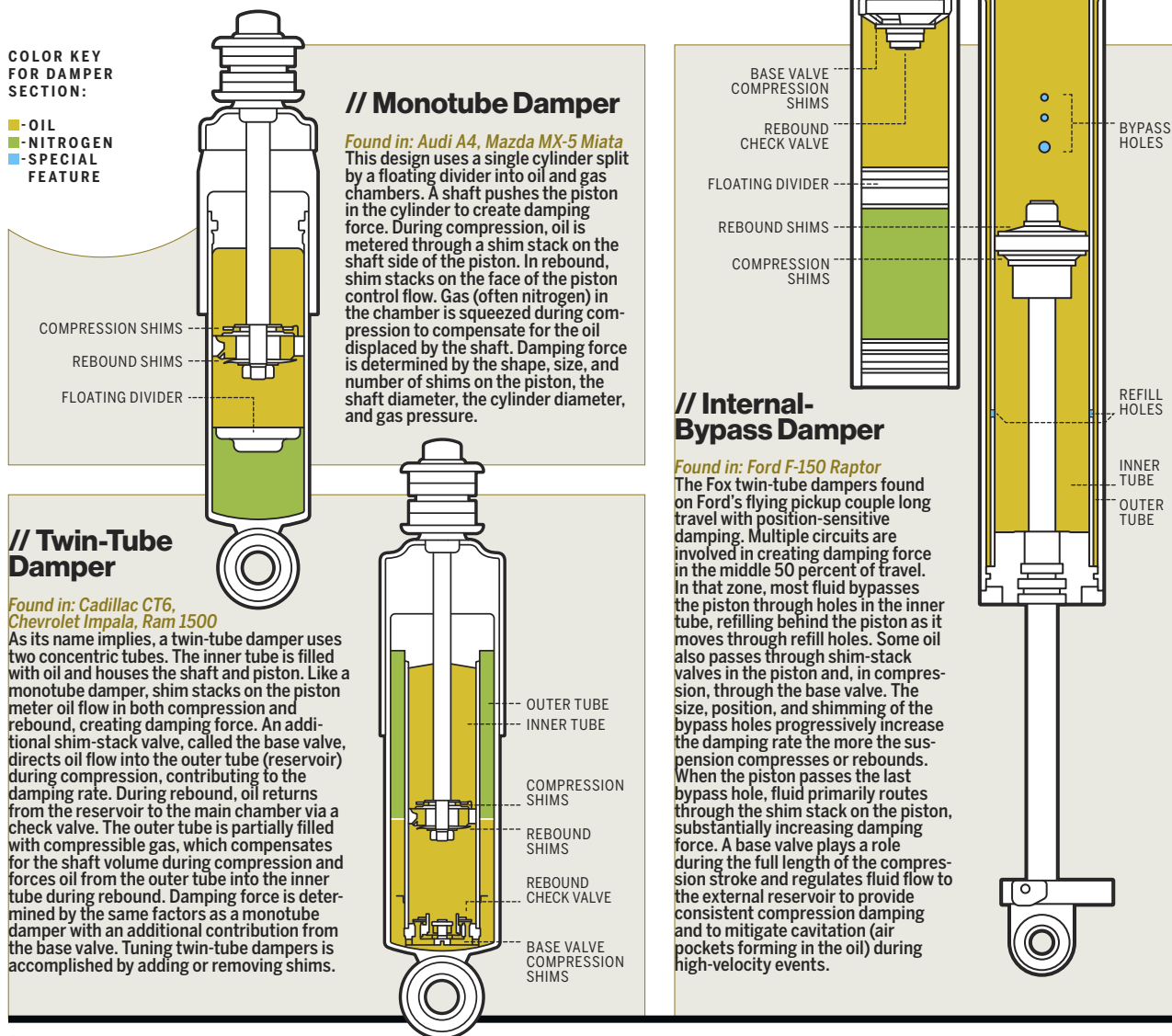
Found in: Cadillac CT6, Chevrolet Impala, Ram 1500

As its name implies, a twin-tube damper uses two concentric tubes. The inner tube is filled with oil and houses the shaft and piston. Like a monotube damper, shim stacks on the piston meter oil flow in both compression and rebound, creating damping force. An additional shim-stack valve, called the base valve, directs oil flow into the outer tube (reservoir) during compression, contributing to the damping rate. During rebound, oil returns from the reservoir to the main chamber via a check valve. The outer tube is partially filled with compressible gas, which compensates for the shaft volume during compression and forces oil from the outer tube into the inner tube during rebound. Damping force is determined by the same factors as a monotube damper with an additional contribution from the base valve. Tuning twin-tube dampers is accomplished by adding or removing shims.

// Internal-Bypass Damper

Found in: Ford F-150 Raptor

The Fox twin-tube dampers found on Ford's flying pickup couple long travel with position-sensitive damping. Multiple circuits are involved in creating damping force in the middle 50 percent of travel. In that zone, most fluid bypasses the piston through holes in the inner tube, refilling behind the piston as it moves through refill holes. Some oil also passes through shim-stack valves in the piston and, in compression, through the base valve. The size, position, and shimming of the bypass holes progressively increase the damping rate the more the suspension compresses or rebounds. When the piston passes the last bypass hole, fluid primarily routes through the shim stack on the piston, substantially increasing damping force. A base valve plays a role during the full length of the compression stroke and regulates fluid flow to the external reservoir to provide consistent compression damping and to mitigate cavitation (air pockets forming in the oil) during high-velocity events.





REAR //

// Form and Function

The Ford F-150 Raptor's internal-bypass dampers have two key benefits: Without complex or costly electronics, they deliver firmer damping as the suspension compresses, and they make your truck look macho without dangling plastic nuts from the hitch.

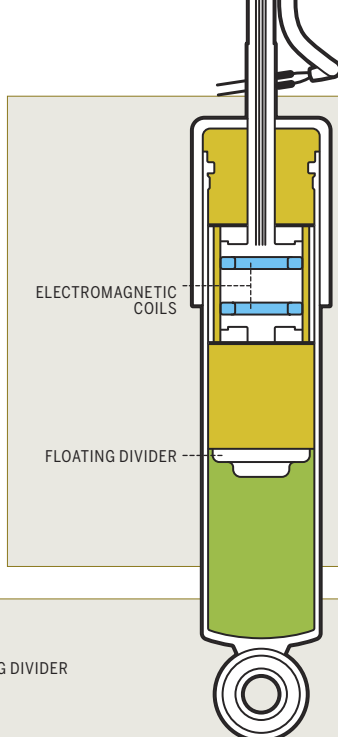


// FRONT

// STATE OF THE ART

"If you go up in spring rate, before riding in the car you can predict what's going to happen. With MR dampers, even after doing this for years and years, I still learn things, I still try things. It doesn't even seem obvious, but you give them a try because you've run out of your normal knobs to turn. I keep finding new things."

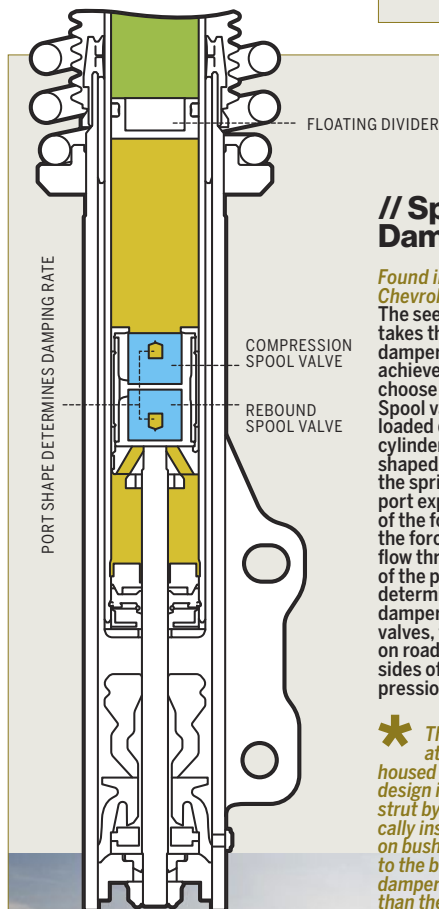
—Mike Hurley, Chevrolet vehicle performance engineer, who has tuned magnetorheological dampers since their use on the 2003 Cadillac XLR



// Magnetorheological Damper

Found in: Cadillac CTS-V, Chevrolet Corvette, Ferrari 488GTB, Lamborghini Huracán

With no valves to dictate damping rates, MR units control wheel and body motions by effectively changing the viscosity of the oil. Though their construction is relatively traditional (a piston at the end of a shaft moving inside a tube of hydraulic fluid), their operation is anything but. Current-generation MR dampers use two electromagnetic coils located in the piston to generate a localized magnetic field around the piston's passages. The hydraulic fluid inside the dampers contains tiny iron particles, distributed randomly before electric current is applied to the piston coils. Applying current to the coils creates a magnetic field, which arranges the particles into lines, making the fluid more resistant to flow. When pressure on either side of the piston is sufficient to break apart the lines of particles, fluid flows through the passages, allowing the piston to move. The strength of the particles' alignment is proportional to the force of the magnetic field so that changing the amperage to the coils changes the damping force.

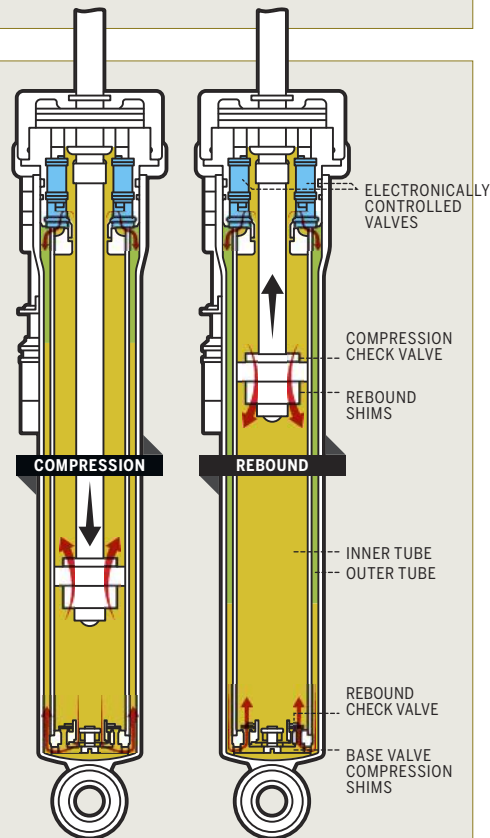


// Spool-Valve Damper

Found in: Chevrolet Camaro ZL1 1LE, Chevrolet Colorado ZR2

The seemingly simple spool-valve damper takes the trial and error out of passive damper tuning by permitting engineers to achieve the exact force/velocity curve they choose using known hydraulic equations. Spool valves, which consist of a spring-loaded disc acting as the lid of a topless cylinder, allow oil to flow through precisely shaped ports in the sides of the cylinder as the spring is compressed. The area of the port exposed to permit oil flow is a function of the force applied to the disc. The greater the force, the more area is exposed for oil to flow through. The shape, size, and location of the ports determine damping force. Spool-valve dampers vary in the placement of their valves, though the simplest varieties used on road cars locate a spool valve on both sides of the piston—one to manage compression and one for rebound.

✱ The spool-valve unit shown here is used at the front of the Camaro ZL1 1LE and housed in an inverted strut. The inverted design increases stiffness over a traditional strut by locating the damper body concentrically inside the strut housing where it slides on bushings. The damper shaft attaches to the bottom of the housing, and the damper body moves around the piston rather than the piston moving within the damper.



// Electronically Controlled Damper

Found in: Ford Focus RS, Infiniti Q50 and Q60, Volvo S90

In most adaptive-damper designs, a combination of electronically controlled valves and passive shim-stack valves dictate damping force. Available in both monotube and twin-tube configurations, placement of their electromechanical valves may vary. This twin-tube example, a new model designed by supplier Tenneco, uses a check valve on the backside of the piston, which permits the piston to move through the compression stroke with very little resistance. During compression, pressure builds in the inner tube as the shaft displaces oil, causing it to flow through the base valve at the bottom of the damper and through the electronically controlled valves at the top of the damper. Compressible gas is used in the reservoir to compensate for the oil displaced by the shaft during compression. Flow is metered during rebound by the shim stack on the face of the piston and through the electronically controlled valves at the top of the piston. Oil returns to the inner tube during rebound via a check valve located underneath the base valve. Opening or closing the valves at the top of the damper varies damping force in both compression and rebound.

4. The Human Element

// Over a 26-year career at Lotus, Matt Becker has had a hand in the chassis tuning of approximately 50 vehicles, although he

can talk publicly about only a handful of them. The various automakers that contracted Lotus through the years typically paid for both Becker's expertise and his discretion. The cars he can take credit for—such as the nimble and docile second-gen Lotus Elise and the 2010 Evora—speak to why his talents were in such demand. Becker left Lotus in 2015 for Aston Martin, where he is now the chief of vehicle attribute engineering.

BY ERIC TINGWALL

PHOTOGRAPHY BY CHARLIE MAGEE //

C/D: Is it ever a challenge to determine the tuning philosophy for a particular vehicle?

MB: That's where some of the art comes in. In my head, I know how I want a car to feel. You need to understand what compromises you are going to make, because ultimately you are going to have to make some compromises. My philosophy is cars don't need to be uncomfortable to steer and handle well. The other thing for me is the linearity of the response of the car is critical. The first thing I look for is to make sure the rear axle has the right level of connection. Rear-axle stiffness laterally has a massive influence on how a car feels and steers. There's an old saying, "If you think it's the front, it's the rear. If you think it's the rear, it's the rear," because everything reacts around the rear axle, so it's absolutely critical to get rear-axle feel correct. Once you've got that, the rest of the car will sort of come together.

C/D: You followed your father's footsteps into chassis tuning. Do you remember how old you were when you began to understand his job?

MB: My parents split up when I was about seven years old, so I used to see my father every weekend and he'd always have a different Lotus and he lived about half an hour from where my mother lived. He'd always be flicking the car around, doing lane changes, and looking for different behavior in the car. I used to ask him, "Can you explain to me what you're doing?" and he said: "I'm looking for the phasing of the response of the car front to rear. I'm look-

ing for the vertical motions of the car. Do they feel balanced front to rear?" All this sort of stuff was imparted to me when I was really young.

C/D: How has the job changed with the advent of electronically adjustable suspension technology?

MB: You can't get away from the fact that chassis electronics massively enhance performance. It gives you another layer of tuning and opportunities for things you can do with a chassis. I do wonder whether passive-suspension cars have a bit of a limited shelf life now. As long as the electronics are done correctly—and this comes back to the artistic side—they add performance. They add capability. The Elise is still one of the best driver's cars out there, in a passive sense, but it's a very niche marketplace now.

C/D: Does it disappoint you to see those very analog cars replaced by today's computerized machines?

MB: That's just evolution, isn't it? Pure passive cars are very communicative, but I actually like the challenge of working with more systems on a car, because it still comes down to this artwork of how you make a car feel connected and engaging. That's the challenge for the engineer, unless he's doing an S-class.

C/D: What's the most difficult part of a chassis engineer's job?

MB: Damper tuning. Tire development is actually quite easy, because when you get different constructions and compounds in tires, it's very easy to pick up subjective results in them. To know how to tune the shims within the damper is absolute artwork. That's where you can really either cock it up or deliver really good results. ■



SUPERBUG!



**More than simply
a restyled and
boosted Veyron,
the Chiron is a
disease vector for
hysterical speed.**

by Aaron Robinson

2017 Bugatti Chiron



f there's any doubt about the Bugatti Chiron's raison d'être, it's written right on the steering wheel, on a large blue button emblazoned with one word: "ENGINE."

We could wax poetic about the marriage of modern technology to the ancient human craving to express vanity and wealth. Or how the 1500-hp Chiron is metaphorically the 700-room Château de Versailles with a tailpipe, how the \$3 million U.S. price means it is no crazier than hiring an artist to spend four years painting God and Adam and all the saints on your chapel ceiling. In other words, about how it is an exuberant, untethered overstatement in the service of generating delirious stupefaction, both in the nobles

who luxuriate in it and the peasants who revel in its reflected glory.

But the new 261-mph Bug is really just about being all ate up with motor. It's about old-fashioned combustion in 16 furnaces amidships that are blown into a furious conflagration by quad fans. Push that ENGINE button and the W-16 ignites, not with the ear-bending bark of an Italian supercar—Bugatti figures it is above that kind of bad-boy theater—but with the manly burble of a lazy 650-rpm idle. In the words of Teddy Roosevelt, speak softly and carry a suitcase nuke.

To be brutally cynical—for that's the last refuge of plebeians who will never be able to afford a Chiron—this car is a do-over. It's a reboot of a last-decade idea for reviving a slumbering auto boutique with a moonshot engineering project intended to create shock and awe. The 1001-hp Veyron 16.4 was the busted sound barrier, the



Bugatti: Making two-tone paint and blue wheels improbably cool for the last dozen years. The Chiron's rear is a collection of beams.

Everest summit, the four-minute mile. It was the car that went 1 mph faster than the fastest race car on the Mulsanne straight—just because. The benchmarks have all been bested. It seems pointless to raise the bar again with another mid-engine two-seat coupe, like enrolling Superman in a CrossFit

class in the hope of widening the gap over those speeding bullets.

Viewed more charitably, the concept was perhaps not fully tapped. The Veyron improved greatly over the 10-year slow drip of its 450-car production run, but its handling never rose above that of a blindingly fast Lexus. Unlike a Lexus, it was loud inside, and not a good kind of loud, but a loud borne of thrumming tires and ticking injectors and whirring accessories and those great





Top left: AP Racing calipers pinch Brembo carbon-ceramic rotors. Above left: Four knobs and a doohickey. The C-shaped cockpit divider is smurfy!

sucking bazookas behind your head. And its slightly corpulent styling was perhaps a shade too Moulin Rouge for some and not enough Yves Montand with a cocked cigarette and a piercing squint. It was an awesome thing, the Veyron, but not above another stab, a sequel. Shock and awe is highly perishable, and engineers always need new challenges.

Over some squid nibbles and other Portuguese delicacies at a Lisbon bistro, I am assured that the Chiron was indeed a worthy challenge. At first, explains chassis development head Jachin Schwalbe, the thinking was just to restyle the Veyron and crank up the boost. But everybody soon realized that going from 1200 horsepower in the hottest Veyron, the Super Sport, to a still-drivable 1500 in the Chiron required more than just a bigger blow [see “The Lump”]. Eventually, nearly every single part number changed in the engine. And the seven-speed transmission. And the wheels, tires, brakes, and self-adjusting suspension. And the body, aerodynamic devices, and interior. Even the hand-painted, solid-silver Bugatti badge on the grille got a facelift.

The next morning, I’m paired up with Le Mans winner and sports-prototype veteran Andy Wallace for a blast through the rolling inland districts of rural Portugal. I once set a personal record of 206 mph in a Veyron Super Sport in Spain, but I’m warned that Portugal is cracking down with speed cameras and biker fuzz who are happy to follow you to the nearest ATM for a spot collection. Still, Wallace and I will see an indicated 197 mph before the sun has set, and, luckily, not one cop.

The relatively few people who have driven a Veyron will notice at once that the Chiron is quieter inside and has a gentler ride. The

strange Michelin PAX tires that cost five figures to replace, with new wheels required at the third tire change, are gone, superseded (at customer pleading—even the obscenely rich have their limits) by more-conventional Bugatti-spec Michelin Pilot Sport Cup 2s, size 285/30-20 in front and 355/25-21 in back. There is less road roar from these massive drums and less displeasing noise from the engine. You hear the husky swell from the enormous titanium exhaust plus the rapid cymbal splash of the turbos snuffling air at a rate measured in blimps per second.

In the European way, Bugatti quotes an acceleration figure in the zero-to-100-km/h (62 mph) metric, stating that it’s “<2.5 sec,” presumably with the new steering-wheel launch-control button activated. Which is good because the first Veyron we tested hit 60 in 2.5. But as Schwalbe points out, at these power levels, it’s almost entirely down to traction. And this is not the same world in which the Veyron made its debut. Today, a Porsche 911 Turbo pulls a sub-three-second 60-mph time, as does a Tesla Model S P90D in Ludicrous Speed mode.

So the Chiron’s horizon-sucking acceleration, while still evoking a sport bike with four wheels, is not quite as dumbfounding as the Veyron’s was in its day. Alas, the Chiron is improved in so many other ways. The throttle, able to summon a bonkers 1180 pound-feet of torque, answers with the slimmest delay in lag, meaning on country lanes you’ll often bawl-whoosh past dawdlers so quickly that you’ll be several dozen car lengths ahead before it occurs to you to pull back into your lane. If roads were striped with the Chiron in mind, the Tail of the Dragon would be one big passing zone.

The steering now lives and breathes, the ratio having dropped from 18.0:1 in the Veyron to 16.4:1, and the rack communi-

2017 BUGATTI CHIRON

VEHICLE TYPE: mid-engine, all-wheel-drive, 2-passenger, 2-door coupe

BASE PRICE: \$2,998,000

ENGINE TYPE: quad-turbocharged and intercooled DOHC 64-valve W-16, aluminum block and heads, port fuel injection

DISPLACEMENT: 488 cu in, 7993 cc

POWER: 1500 hp @ 6700 rpm

TORQUE: 1180 lb-ft @ 2000 rpm

TRANSMISSION: 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 106.7 in

LENGTH: 178.9 in

WIDTH: 80.2 in

HEIGHT: 47.7 in

PASSENGER VOLUME: 54 cu ft

TRUNK VOLUME: 2 cu ft

CURB WEIGHT: 4400 lb

PERFORMANCE

(C/D est)

ZERO TO 60 MPH: 2.3 sec

ZERO TO 100 MPH: 4.8 sec

1/4-MILE: 9.4 sec

TOP SPEED: 261 mph

FUEL ECONOMY

EPA COMBINED/CITY/

HWY: 10/8/15 mpg

(C/D est)

Bugatti by the numbers:*

0.06: gallons per second of fuel injected at 6700 rpm

2.1: quarts per second of oil pumped at 6700 rpm

11.9: weight of a connecting rod in ounces

31: number of soccer fields equivalent to the catalytic-converter substrate’s surface area

35.3: cubic feet per second of air sucked at 6700 rpm

42: number of cars owned by the average Bugatti driver

50: approximate number of ECUs aboard

500: number of Chirons to be built over the next eight years

870: number of miles the average Veyron accumulates in a year

*Provided by Bugatti.



This knob controls the four drive modes—EB (comfort), autobahn, handling, and lift, which raises the car for speed bumps, etc. A key that lives in a socket next to the driver's seat [above] activates top-speed mode. It raises the limiter from 236 mph to 261. The engineers think 310 mph may be possible.

cates with your palms. The chassis actually sniffs the pavement a little, occasionally following the changing camber and feeling altogether more organic. Deciding on an appropriately ridiculous cornering speed was such guesswork in the Veyron; in the Chiron it's second nature if still ridiculous. And when you need to arrest all this motion, the AP Racing calipers and Brembo carbon-ceramic rotors display a delicate progression belying their enormous size.

Perhaps Louis Chiron's biggest achievement was being the oldest driver (55) ever to compete in a Grand Prix. The big C that defines the Chiron's side profile as well as the spinal ridge and extravagant sweep of the LED accent light that cleaves the cockpit is either a tribute to his name, to the expansive way Ettore Bugatti rendered the "E" in his signature, or the Type 57SC Atlantic. The company leaves it up to you to decide, but the Chiron is an altogether more purposeful shape than the Veyron, the horseshoe grille pushed forward into the wind to initiate a sleeker and somewhat tenser profile. The eight LED headlights, which fire sequentially inward on startup, and the 82-LED taillight blade are riveting elements, the latter housed in a thin scythe that is milled from a 441-pound block of aluminum.

Like the Veyron's cockpit, the interior exudes an art deco vibe, but the Chiron takes it even further. The center stack looks like the four fingers of a metal sea anemone, the tips of which are the digital readouts that can tell you everything from the oil temperature to the maximum speed and horsepower reached on the current trip, depending on which of the four information menus you select.

Design director Etienne Salomé, a Parisian in exquisitely tailored blue silk who is as Bugatti as Bugatti gets, explained that he didn't want an all-TFT instrument cluster that is just a dark hole when the car is off. "When a Chiron goes to Pebble Beach in 50 years, and children look in the window, I want them to see something," he said, referring to the large analog speedometer in the center of two color screens that display, when on, car and trip data (it said we averaged 20 mpg) plus a navigation map. There is no plastic anywhere in the cockpit. If it looks like metal, it is metal. If it looks like leather, it is one of the 16 hides that go into making each Chiron. One-carat diamonds support the speaker diaphragms.

Aside from a flat underbody tray, plus a system of ducts and slats up front that create both a high-pressure zone in the wheels for cooling the brake rotors and a low-pressure air curtain around the front wheels that sucks out the hot air, there are two active elements. Underbody flaps forward of the front wheels adjust their pitch with the car's speed to improve downforce, and the large rear wing rises on stilts, pitching up 3 degrees in top-speed mode or 49 degrees down to act as an air brake. When you turn off the Chiron, the wing does a little dance of reluctance, like a puppy unwilling to go back in the house, as it drops, bit by bit, back into the body. This slow shimmy is a warning, to keep people from getting their fingers crushed by a wing stout enough to support 772 pounds of downforce at 236 mph.

Almost certainly the last of its kind, as supercars give way to super-hybrids and super-electrics, the Chiron's main selling point against other objet d'art from the likes of Koenigsegg is that it hails from the VW Group. So this is art that is likely to start in 20-degree weather. Just imagine Michelangelo or, indeed, Ettore Bugatti, having 3-D computer modeling, wind tunnels, and hundreds of artisans at his disposal. Would the end result have been so different? ■

The Lump:

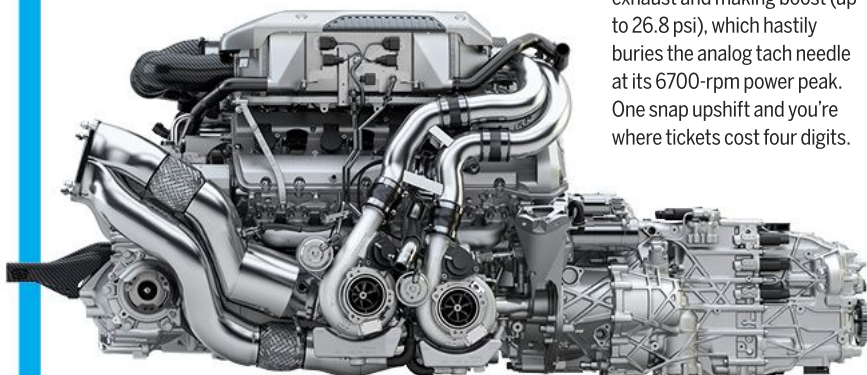
No giant batteries or electric motors to be found here; you pump in the petroleum and out comes the kinetic energy of planets colliding. In reengineering the quad-turbo W-16, the thought spiral was quick and steep: As long as they were going with 69 percent larger turbos, why not change the plumbing to interconnect them sequentially, thus improving the low-end engine response? And as long as they were in there, why not try to shave

some weight with things like a carbon-fiber intake manifold that should have its own room in the Museum of Modern Art?

A key component is an electrically actuated exhaust-gas valve painstakingly machined from solid Inconel that spends its working life roasting in an 1800-degree-Fahrenheit draft. It is astonishingly heavy given that it and its housing are about the size of a deck of playing cards. One on each side of the engine controls the exhaust flow to the two secondary

turbos. In the old Veyron, each of the four turbos was fed by four cylinders, which meant they had to be smaller to give decent response.

When you punch the Chiron, the two primary turbos each get eight cylinders' worth of blow, which makes them spool up PDQ even though they are larger. Up to 3800 rpm, the megavalves bleed exhaust to the secondary turbos to keep them spinning, but above 3800 the valves are fully open, such that all four of the snails are now flushed with exhaust and making boost (up to 26.8 psi), which hastily buries the analog tach needle at its 6700-rpm power peak. One snap upshift and you're where tickets cost four digits.



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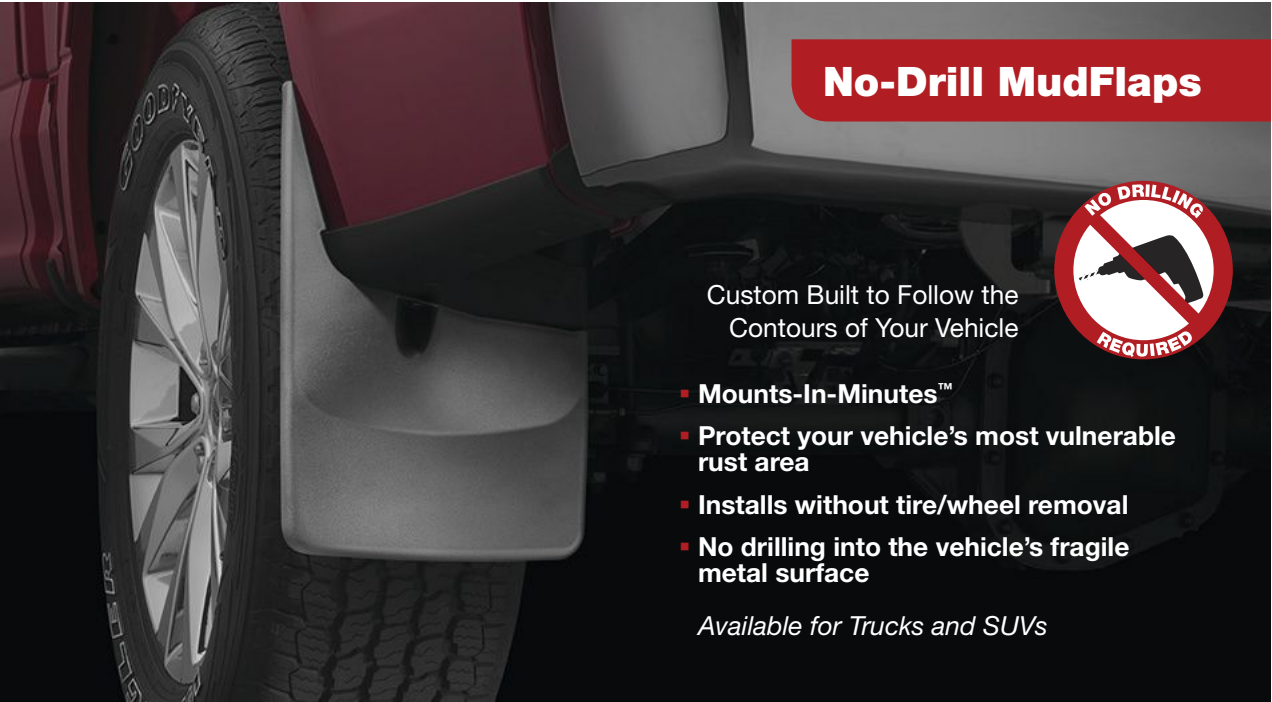
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A photograph showing two large brown paper grocery bags filled with various fruits and vegetables, including tomatoes, bell peppers, and apples. The bags are standing upright on a black, textured mat with several black plastic dividers. The mat is placed on a dark, possibly carpeted, surface. The WeatherTech logo is visible on the mat.

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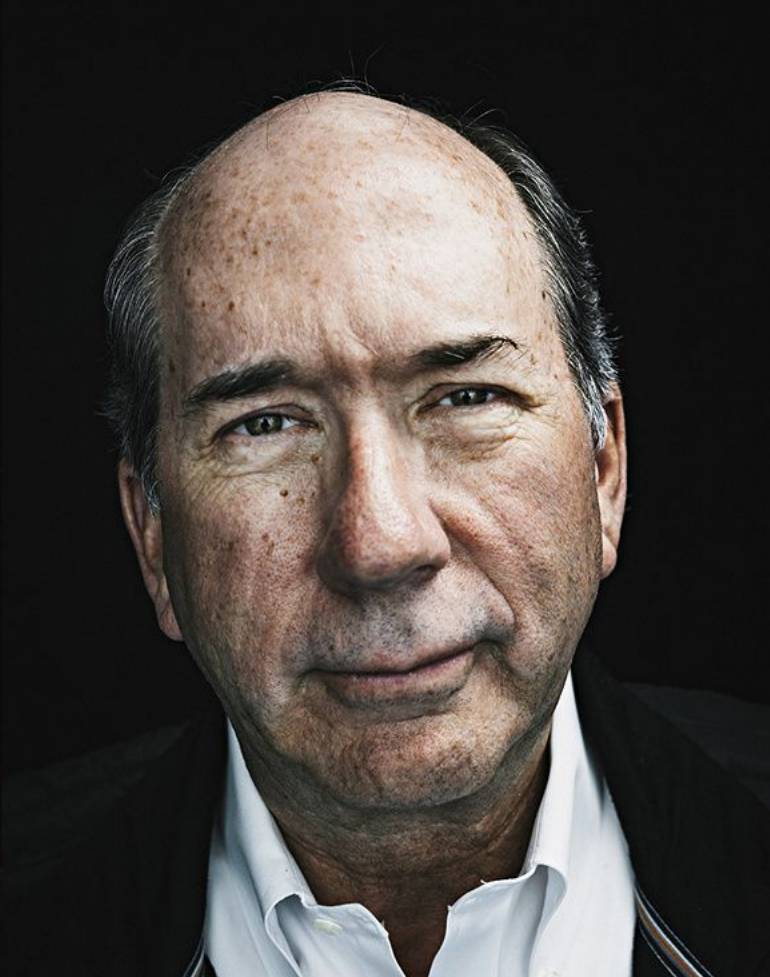
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BY BRETT BERK

PHOTOGRAPHY BY ROY RITCHIE

PRESTON HENN IS THE OWNER OF AN EXTREMELY PROFITABLE south Florida swap meet, as well as some of the world's most elite vintage and contemporary cars. Quite a few are emblazoned with the prancing horse. Yet, although he already owns a Ferrari FXX and a LaFerrari, when the 200 exuberantly affluent buyers for the \$2 million Ferrari Aperta were recently alerted to their anointment, Henn was not among them. So he did what any respectable flea-market oligarch would do: He sued, demanding a car and a five-figure defamation settlement. Did this result in his acquiring an Aperta? Negative. A payout? Nope, he ultimately dropped the suit. Was the legal action likely to advance Henn's ability to acquire rare new Ferraris from the factory in the future? Signs point to no.

Experienced experts concur that you don't piss off Willy Wonka if you want the Everlasting Gobstopper. Investor, collector, and boutique-car designer Jim Glickenhaus has had his share of legal battles with Maranello—over his “lemon” of a 308, and then later

PICTURED CLOCKWISE FROM TOP LEFT: CAMILO PARDO, KEN LINGENFELTER, KRIS SINGH, MARK LINDEE



Every man needs a place to rest his arm. Among Kris Singh's armrest options is his Lamborghini Veneno coupe, one of only three sold.

over his right to use the Ferrari name on a one-off Enzo he commissioned from Pininfarina. According to Glickenhau, when it comes to getting admitted into Ferrari's innermost sanctum of owners, there are only two choices. "You either do your own thing, like I did," he says, giving his prescription for not getting in, "or you pay them a fortune and get on their good side, and maybe they'll let you buy one of these cars eventually."

Almost anyone with the appropriate bank balance can walk into a dealership and purchase an entry-level exotic. Say, a Ferrari California T or an Aston Martin Vantage. Sure, these vehicles are special, but in the pantheon of automotive exclusivity, they're akin to an ancient Egyptian retainer sacrifice, the many soldiers or servants embalmed and entombed to care for the Pharaoh. They're inside the pyramid, but not in the best section. Just as a mortal cannot stroll into Giza and ride out onto the rivers of the Underworld in a funerary boat, a billionaire cannot pull up at the local Aston Martin store and simply write a check for the hyper-rare Valkyrie. This requires getting on The List.

The List is not mythological. Neither is it monolithic. But each exotic carmaker we contacted for this story—Aston Martin, Ferrari, Lamborghini, McLaren—confirmed that it has an internal registry it uses to identify potential owners for absurdly pricey, extremely limited-edition vehicles. "We know all our best clients individually," says Nicola Boari, Ferrari's head of product marketing. "And those are the people we have in mind when we plan a special series. With these cars, Ferrari already has a roster of those clients potentially interested and will thus contact them directly to see if they would like to purchase a car."

The List is not some 1920s fraternity handbook. It doesn't include written qualifiers or pictograms for a secret handshake. That would be gauche. (It might also be illegal.) Instead, its rules are unspoken and unshared, like the discretionary door policy of a hot nightclub. Because, for those queued up, every movement brings them that much closer to the absurd opportunity to write a check that exceeds many well-off people's retirement portfolios.

In fact, The List determines the precise scale of that opportunity, meaning the number of cars included in any limited-production run. The core goal of the manufacturer is, of course, to ensure that demand outstrips supply such that every car has an owner before it's even built. So, for example, when the application process for McLaren's P1 opened and 1500 people with gold bars singeing holes in their pockets begged to be lightened by \$1.15 million, this provided the company with a basis for settling on a final output.

"Realistically, the general rule is 50 percent of people are going to end up flaking," explains John Paolo Canton, head of public relations at McLaren North America. "So that brings us to 750. And then you get to the point where you say, all right, if there are 750 serious people here, we need to keep demand higher than supply for two reasons. One, it's the smart brand thing to do, but two, the fewer we make, the more committed the buyers will be."

By only producing half of what the brand knew it could assuredly sell, or just 375 cars, McLaren added gratification for those blessed with a car. And it created unfulfilled demand to entice potential buyers for future specials. The List thus ensures a win-win for everyone.

"I can be blunt and say the specials, as we call them, they're profitable," says Matt Clarke, Aston Martin North America's director of marketing and communications. "Otherwise we wouldn't make them." But in today's market, where these brand-new, extremely limited vehicles no longer go through a cycle of depreciation before escalating in value, the profit motive also exists for buyers.

"I was looking this morning at the Vantage GT12, and they're already selling well above list," Clarke says, noting that prices on the 2015 model have increased by well over \$100,000. "They're a very safe investment." The rich do get richer, just for parking their assets.

So how does one get added to The List? First, acquire money—preferably Panama Papers quantities of money. Then evince a willingness to reflexively flush vast amounts of it. "The rule that we follow is first come, first served," says Vittorio Gabba, head of Lamborghini's One-Off and Ad Personam programs. "Meaning that the first customer who puts down the deposit is the first to get the car."

Beyond being oceanically liquid, it is important to be appropriately connected and vocal. After being wowed by the radical 2012 Lamborghini Aventador J, Kris Singh, a 38-year-old Miami-based investor, let his interest in future Lambos be known. "That car really resonated with me because it highlighted what Lamborghini is the king of: crazy," Singh says. "So I reached out to everyone I knew there, and I said, 'Listen, the next time you guys do something like this, I want to be a part of it.'" The subjects of his outreach included the company's regional sales manager, its research and development boss, and its North American division president.

Singh didn't just Google-stalk and cold-call these executives. He had already built up relationships with them over the years by buying Gallardos and Murciélagos and by being active in owners' groups. All of this is germane to List placement. While there is no overt requirement for prior purchases, brand representatives all say that being a consistent buyer helps. Singh was eventually rewarded in 2013, allowed to purchase one of three \$3.9 million Lamborghini Veneno coupes, sight unseen. Recent asking prices for the roadster have been in the \$8 million to \$11 million range.

"There's not a formula, per se," says Aston Martin's Clarke. "But you always start with your loyalists before you cast the net any wider." This is especially true for collectors with a pedigree in ultra-exclusive purchases. "If you've got some credit in the bank in terms of buying prior specials, then we're absolutely going to go to you first," he says.

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LIST OF THE LIST: RECENT RELEASES FOR THE EXTRAORDINARILY PRIVILEGED



Unlike most love matches, these brands do not require monogamy. “We know that the customer who owns a Bugatti, they own a LaFerrari, they own the McLaren P1,” says Lamborghini’s Gabba. But the marques are always looking for ways to gain converts. This is another way to jump ahead on The List. Canton says McLaren will often reach out to “somebody who, maybe there’s a budding relationship and they’re driving a competitor-brand car.”

This is how California investment manager Mark Lindee ended up in a P1 after spec’ing a Ferrari 458 Italia. “McLaren was a relatively new retail brand when they conceived of the P1,” Lindee says. “They had a dealership in Beverly Hills, the general manager of which had been the general manager of a local Ferrari dealership whom I’d built a Ferrari with. And when they announced the P1, he called me and said, ‘We have to do this car.’”

Movement up The List can also happen through good deeds. This could entail loaning the company a special vintage car for an event, but it can also include something as simple as demonstrating appreciation for an elite vehicle’s capabilities beyond that of an appreciating asset. Speaking of the brand’s recent \$2.3 million, track-only Vulcan, Clarke says: “Ideally, we don’t want them all disappearing into collections and never seen again. We do want it to go to people who would actually race it.”

This generosity can even extend to actual charity. Michigan performance-shop owner Ken Lingenfelter has an extensive private collection of cars, containing myriad limited-run exotics, which he opens to the public for events and fundraisers. “My name, our brand, is kind of known worldwide,” he says, careful to enunciate a Midwestern humility, “and it provides a really great venue, a great opportunity for someone to get exposure for their vehicle in a kind of exclusive way.”

In this same vein, fame sometimes helps. Rock star Eric Clapton was able to get Ferrari and Pininfarina to build him a one-off tribute to the 512BB in 2012, and Aerosmith’s Steven Tyler requested a custom build for the first Hennessey Venom GT convertible. Likewise, social-media presence plays an increasingly important role. “I think a lot of companies are looking for guys who are followed on the internet and tweet and post,” says Glickenhaus. “Use any advantage you have. Nothing is sacred.”

Nothing, that is, except money. Though profit is a core motive for buyer and seller

alike, every manufacturer and customer with whom we spoke decried the practice of flipping cars. In the bizarre world of the ultra-rich, cashing in on your List position is a shabby violation of the tenets of automotive nobility. One doesn’t buy a Picasso to sell it. One buys it to own it.

Meanwhile, the market is carefully tracked for fealty and transgression, and a quick resale might become what Aston’s Clarke calls “a black mark” against even the best customer. Slinking quietly between brands offers no cover in a tiny market where everyone knows everybody. “In my office, there are a fair amount of people from Ferrari,” says McLaren’s Canton. “And they knew at Ferrari who was keeping cars and who was flipping cars.”

But the most important factor in placement on The List is perhaps the least intuitive. Though decisions seem to be made centrally at brand headquarters, even at this lofty level, the local car dealers are still the front line of consumer interaction. They’re the first call a manufacturer makes as it scouts quality prospects, and they’re the requisite legal locus of every transaction.

“The best dealers will give their best customers a hint that something special is coming,” says Clarke. “And they will know straight away, ‘There are three people I know who will take that, without my even asking.’”

Lingenfelter concurs: “One of the reasons I get invites to buy some of these great cars is because I’ve had a long-standing relationship with my Ferrari dealer. And they know that when I buy them, I don’t buy them to flip them and make money; I buy them to enjoy them and to invite other people to enjoy them.”

Yet even for those inscribed on The List, there’s always a chance of not making the cut. A production run may be too limited. A

Any McLaren P1 is pretty special. But a P1 custom-tailored to one’s exact desires, like Mark Lindee’s purple-and-orange car, is extra special.



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regional allotment may be fulfilled. Having 500,000 Instagram followers may be insufficient.

For manufacturers, the challenge here is that at this price point, everyone in consideration is an extremely privileged person, used to always having their demands met. How does one say no to people who are accustomed to only hearing yes?

"These people, they know what they want and they sometimes are insistent, but they know the limit to where they can push," says Lamborghini's Gabba. Consolation prizes help. "Most of these

Like us, Ken Lingenfelter parks all his red special-edition Ferraris together in reverse chronological order: LaFerrari, Enzo, F40, and 288GTO.

people, if you say no, they are put in priority for the next one-off. So for sure we know we always take care of them in the best way possible."

Singh certainly found the limit when he tried to get to the top of McLaren's list for the BP23, the triple-seat successor to the famed F1. "They basically told me, 'Register your interest.' And they said, 'You've never owned a McLaren.' They're like, dude, we can't say no to P1 owners and F1 owners to give you one. And I said, 'You know, I actually respect that.'"

Still, at times these companies take great pleasure in saying no. "I mean, if Justin Bieber is putting his name down, I would definitely say no," says Aston's Clarke. "But we don't tend to attract those people that we'd like to say no to."

Of course, testing the limits of no can cut both ways. "One time I asked Lamborghini to put a rocket launcher on my car," says Singh, chortling at the obvious joke. "I was like, 'I want an actual rocket launcher coming off the back. I want to be able to shoot lasers at people.' And, they called back and said [affects Italian accent], 'Kris, we have heard back, and we cannot do the lasers or the rocket launcher. For safety reasons.'"

THE BLUE-OVAL LIST: THE MAKER OF THE TEMPO GETS CHOOSY

Exotic carmakers have cultivated relationships with exclusive clients for decades. Not so at Ford, which for the most part has spent the past 114 years peddling mass-produced affordability, from the Model T to the Taurus. As the \$450,000 GT supercar comes to market, the most expensive model in the current catalog is a \$78,000 Super Duty F-450—not exactly lustworthy unless you have a decommissioned battleship to tow. So the company faced a dilemma in allocating the first 750-car batch of GTs (out of a promised total production run of 1000). Ford did not want to just ship the cars to preselected Ford dealers, as it did with the 2005 GT, and see them slap on huge premiums. Nor did it want to sell its new halo car entirely on a first-come, first-served basis.

"When we sat down and looked at the numbers, we thought, 'How do you do this fairly?'" says Henry Ford III, Ford Performance marketing manager and the great-great-grandson of the guy who first put his name on the building. "How do we get these cars in the hands of those we think are true Ford brand ambassadors and will really go out and enjoy this vehicle and use it in a way we think, and they think, helps celebrate the Ford brand and the innova-

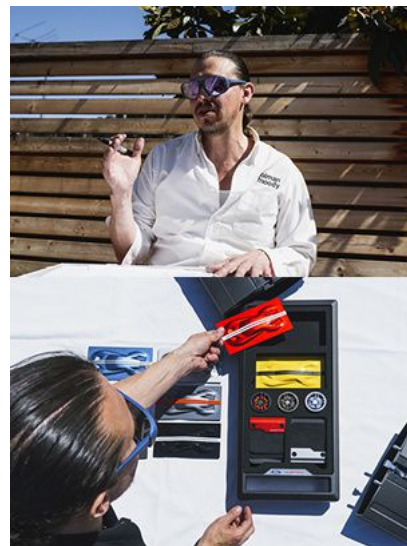
tion and technology behind the Ford GT?"

The answer was to create an online application system, querying would-be buyers on, among other things, their Ford vehicle ownership, racing credentials, charitable intentions, and social-media reach. More than 6500 applications came in, the great majority earning polite rejection letters, some of which appeared online. Plenty of those chosen by Ford also shared their good fortune publicly, as if they'd earned an Ivy League spot.

Among those awarded the right to buy was Detroit's Camilo Pardo, who just happened to have designed the 2005 Ford GT. But he still filled out the application. "I had to call Raj Nair, who is the main engineer behind the whole vehicle. And he said, 'Just fill it out the best you can, and there's an area in the bottom for comments. Fill that all up.'"

Ford's list wound up becoming a hugely public display, the very opposite of the typical quiet discretion of exotic brands. This, of course, generated a lot of press for Ford, which seemed to be the real point behind its scheme. What's more, Ford ended up choosing quite a few GT aspirants who didn't own another Ford—13 percent, according to Nair, Ford's executive vice

president of product development and chief technical officer. Ford now has a backlog of applications for the final 250 cars but has vowed to reopen the application process by 2018 to other interested parties, meaning you have some time to build your Instagram following. —BB



Designer of the 2005 Ford GT, Camilo Pardo shows off the order kit each buyer of the new Ford GT was sent to work out a preferred color scheme.

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Departure: Mar/2017

Wherein Ford's modern-day pony car evolves before our eyes. *_by Mike Sutton*

We live in strange times. A former reality-TV star has keys to the White House, the Chicago Cubs are World Series champs, and Ford Mustangs come with independent rear suspensions. But the Blue Oval's seminal pony car has not lost all sense of tradition as it finally enters the modern age and, with it, markets outside the U.S. It's still a workaday barnstormer, and the Mustang's evolution is still shadowed, as it was in the '60s and '70s, by a hard-charging Chevrolet Camaro. That it shared our long-term garage with a 2016 Camaro SS lent us perspective on what is the most forward-thinking Mustang in half a century.

Our 17-month, 40,000-mile rodeo began about a year after the then-new 2015 Mustang celebrated the golden anniversary of the original pony's debut. This latest GT coupe also secured an immediate spot on our 10Best list (since displaced by the Shelby GT350), which ultimately led to this

Rants & Raves

"The engine makes a great sound, but it's just not loud enough. I want more auditory drama from a V-8 called Coyote."
— Joseph Capparella

"I just feel so bad-ass behind the wheel of this thing, and I don't get that feeling in the Camaro."
— Drew Dorian

one taking up temporary residence at 1585 Eisenhower Place.

It's an altogether more sophisticated steed. The addition of the multilink rear end and a revised front strut suspension has polished the Mustang's road manners to an unexpected shine, with the newfound refinement bolstered by sleeker proportions and a classier cabin with better ergonomics. It immediately trounced the Dodge Challenger and the previous-gen Camaro SS 1LE in a comparison test.

Minor changes for 2016: Ford's much-improved Sync 3 infotainment interface replaced the MyFord Touch system, and, in a nod to '60s nostalgia, designers added barely visible LED turn signals to the hoods of GT models (then subsequently removed them for the 2017 model year).

Ford likes to hype the Mustang's newly available 2.3-liter EcoBoost four-cylinder, but our manual-saving hooligan ways meant that a stick-shift GT with the 5.0-liter Coyote V-8 was the only way to go. For 2015, Ford massaged the smooth, rev-happy 5.0 to produce an additional 15 horsepower and 10 pound-feet of torque, bringing it up to 435 and 400, respectively, which helps compensate for the extra 130 or so pounds the new generation gained. The standard Getrag six-speed manual also entered '15 with minor revisions, including reduced clutch and shifter efforts, even if the shifter's tight gates mean you sometimes grab fifth gear when reaching for third.

In the name of parsimony, we started with the V-8 coupe's Premium trim level for \$37,200 (base GTs start about \$4000 less) and went light on the extras. Along with standard automatic HID headlights, eight airbags, and the GT's line-lock burnout software, the Premium setup includes an 8.0-inch touchscreen in the console, dual-zone automatic climate control, heated and cooled leather front seats, selectable driving modes (normal, sport-plus, track, and snow/wet), ambient lighting, and heated exterior mirrors with galloping-pony puddle lamps. Premium trim also adds nicer interior



A dark blue Ford Mustang is shown from a front-three-quarter view, driving on a wet cobblestone street at night. The car's headlights and fog lights are on, reflecting on the wet pavement. In the background, a multi-story brick building with large, multi-paned windows is visible. A street light on the left creates a bright glare. The overall scene is moody and urban.

**"I PARK A LOT OF CARS IN MY DRIVEWAY, BUT NOTHING
BRINGS OUT THE NEIGHBORS LIKE THE MUSTANG."**

—CAROLYN PAVIA-RAUCHMAN, COPY CHIEF



materials, such as a seemingly machine-turned aluminum panel across the dash, but some hard plastics are reminders of the Stang's blue-collar roots.

We took a pass on navigation, adaptive cruise control, and other amenities, save for black leather manual Recaro sport seats (\$1595) and the GT Performance package (\$2495), which nets six-piston Brembo front brakes with 15.0-inch rotors (up from the base 13.9-inchers) and a shorter 3.73:1 rear axle with a Torsen limited-slip differential.

The Performance package also features chassis and strut-tower braces, a firmer suspension tune, a larger radiator, and revised programming for the electrically assisted power steering and stability-control system. The bundle's painted 19-inch wheels wrapped in staggered Pirelli P Zero summer rubber (255/40s in front, 275/40s out back) completed our car's midnight-rider visage.

Upon its arrival in late fall, there was just enough time to break in and track-test our GT before it needed a set of OE-size Bridgestone Blizzak LM-32 winter tires to stay out of snowy embankments. When new, it dashed to 60 mph in 4.3 seconds and covered the quarter-mile in 12.9 at 112 mph, making it the quickest GT we've tested and almost as fleet as the 526-hp GT350. A solid 156-foot stop from 70 mph



Rants & Raves

"The thunking sounds that come from the drivetrain on upshifts kinda ruin this otherwise excellent car."

— Rusty Blackwell

"It's 74 degrees and sunny out. This car is hotter than the surface of the sun, and the A/C is having a really hard time doing anything about it."

— Jeff Sabatini

"Although the latest Camaro steers better, rides better, and generally drives better, I think Ford did a vastly superior job stylistically."

— Dave VanderWerp

"The Recaro's bolsters are so big that I have to somehow reach around them to shift, and they render the armrest on the center console useless."

— Jennifer Harrington

and 0.94 g of lateral stick evidenced the latest Mustang's impressive road adhesion, despite both figures trailing the 150-foot and 0.98-g returns posted by our manual Camaro SS. (The 455-hp Chevy hit 60 mph in four seconds flat, and it blitzed the quarter in 12.3 at 118 mph.)

Although the Recaros lacked the power adjustability and heating and ventilation offered by the Premium's standard thrones, the GT quickly gained supporters for its sinister presence and a design penned with just the right amount of retro. It wasn't our first choice on chilly mornings or for long trips—rear-seat comfort being largely dependent on the ease with which passengers could remove their heads—but the Mustang drew high marks for day-to-day entertainment and livability as a two-seater. The visibility up front is good, with more glass and a notably taller saddle than in the Camaro, and the improved ride quality and composure from the 21st-century suspension don't constrict the car's playfulness or chuckability. It may be the most advanced Mustang to date, but there's old-school charm in the GT's lively connection to the road that you don't get from the Camaro's industrial-adhesive grip.

Due to the supersoft Pirellis and our sliding around, we burned through two—two!—sets of rear P Zeros before the Mustang could return to the strip at 40,000 miles, at which point it returned nearly identical acceleration figures as when new, only upping its quarter-

The night belongs to Mustang (and also to Michelob). Want to fit into the optional Recaro seats? Try switching to 95-calorie Michelob Ultra.

Service Timeline: Burnin' rubber, and one big pothole.

Key: ● - Repairs ● - Damage ● - Maintenance
● - Normal Wear ● - Oil Additions

October 8, 2015
603 miles: Ford Mustang GT arrives at C/D HQ

November 18, 2015
3010 miles: Swap to 19-inch Bridgestone Blizzak LM-32 winter tires

December 10, 2015
● 4156 miles: Add 0.75 quart of 5W-20 synthetic-blend engine oil

February 18, 2016
● 9941 miles: First service: oil and filter change and inspection, \$42

April 15, 2016
● 14,191 miles: Fix suspension damage from pothole impact. Replace left-rear damper, shock mount, fuel-filler pipe, and perform wheel alignment, \$732

April 19, 2016
● 14,204 miles: Remount Pirelli P Zero summer tires

June 27, 2016
● 19,801 miles: Second service: oil and filter change, replace cabin air filter, and tire rotation, \$83



mile trap speed by a tick to 113 mph. The new rear tires also helped increase the car's lateral grip to 0.96 g, another best for a GT, yet stretched the 70-to-zero braking distance by 10 feet to 166. Further confirming our Ford's appetite for rubber was the need for yet another set of rear Blizzaks for its second winter in Ann Arbor.

We didn't expect much from the 5.0 in terms of fuel efficiency, and the short gearing that's part of the Performance package made quick work of the fuel supply when commuting. But several treks to Illinois, Indiana, Kentucky, and Virginia bumped our average figure to 20 mpg, or 1 mpg better than the car's EPA combined rating. We also saw fuel economy as high as 27 mpg on some highway runs. But the Mustang's 16-gallon tank meant that we usually could squeeze only about 300 miles from a stint, at which point most drivers were ready to take a break from the constricting Recaro.

Indeed, the seats were our greatest source of frustration. Their exaggerated bolsters impeded smooth shifting, and our drivers found it hard to comfortably settle into the chairs. While some occupants on the larger side did find the front buckets ache-free over long stretches, many never fully adjusted.

A brake pedal that grew increasingly grabby on initial application added to our annoyance, as did a host of clunks from the transmission and driveline whenever we worked through the lower gears. We had the dealer look into both issues, but the service desk deemed everything to be operating within normal parameters.

Servicing our pony was much easier on our wallets than the \$2877 we spent on rubber. Four scheduled oil changes and inspections averaged \$57 each. Our only non-tire-related problem was the result of Michigan's roads: A nasty pothole caused \$732 worth of damage to the Mustang's right-rear suspension, with the dealer taking less than a week to replace the fuel-filler tube and a busted damper and its mount.



August 9, 2016

22,345 miles:
Replace worn rear summer tires, \$480

September 26, 2016

24,879 miles:
Add 1 quart of 5W-20 engine oil

November 18, 2016

30,252 miles: Third service: oil and filter change and tire rotation, \$62

November 22, 2016

30,421 miles:
Reinstall Bridgestone winter rubber, including replacing worn rear tires, \$615

30,421 miles: Replace damaged tire-pressure sensor, \$36

March 3, 2017

40,609 miles: Fourth service: oil and filter change and inspection, \$42

March 3, 2017

40,609 miles:
Replace second set of worn rear P Zeros, \$508

40,610 miles: Long-term test concludes

OPERATING COSTS (FOR 40,000 MILES)

MAINTENANCE	\$229
NORMAL WEAR	\$1603
REPAIR	\$0
DAMAGE AND DESTRUCTION	\$768
GASOLINE (@ \$2.59 PER GALLON)	\$5180

SERVICE

DEALER VISITS (SCHEDULED/UNSCHEDULED)	4/1
DAYS OUT OF SERVICE	2
UNSCHEDULED OIL ADDITIONS	2 qt





But as technical director Eric Tingwall puts it, “The Mustang became significantly less cool the day a Camaro SS joined our long-term fleet.” The new-for-2016 Camaro is a formidable foe, with the SS toppling the GT in its first comparo, and both the V-6 and V-8 Camaros earning 10Best awards the past two years. Presented with the Chevy’s greater power, better handling, and nicer suite of extras in 2SS trim, our Ford’s shine immediately began to dim. The GT’s heavily muffled exhaust seemed to grow even more so, lacking the raucous startup bark and wide-open roar of the Camaro’s actively controlled trumpets. The linear, high-revving 5.0 felt malnourished after pedaling the SS’s torque-rich small-block, which was just as happy lugging at 1200 rpm as it was blasting to redline. And the Ford’s squirminess under power and at the limit appeared more pronounced and uncouth. If the latest Mustang aces the traditional pony-car formula, the new-age Camaro has true sports-car ambitions.

As the Mustang’s odometer rolled past 40,000 miles, though, our preferences had yet to coalesce, the choice between the two still very much dependent on “which brand you’ve sold your soul to,” according to



Rants & Raves

“I feel much more comfortable in the Stang than I do in the Camaro, not just because of visibility concerns but also because of the seating position.”
— Joseph Capparella

“The interior overall seems cheap for a \$40,000 car, with lots of hard plastic.”
— Dave VanderWerp

senior editor Jared Gall. Which is why both of these models are still around after so many years, stronger than ever. While the Ford lacks the latest Chevy’s masterful ride and handling, it packs greater style and is easier to live with as a daily driver. And despite the Mustang’s fussier engine and drivetrain, the greater effort needed to wring the most out of it can be highly rewarding and fun.

Ford says it is committed to developing the Mustang even further for the 2018 model, with a raft of changes that both align it better with the Camaro and address many of our complaints. Those alterations include more-powerful engines, an active exhaust system, an updated manual gearbox, revised suspensions with available magnetorheological dampers, and an optional 10-speed automatic transmission.

So the changes keep coming. We just hope Ford doesn’t refine the fun out of it. But that could never happen, could it?

2016 FORD MUSTANG GT PREMIUM

PRICE AS TESTED **\$41,290**
BASE PRICE **\$37,200**

VEHICLE TYPE: front-engine, rear-wheel-drive, 4-passenger, 2-door coupe
ENGINE TYPE: DOHC 32-valve V-8, aluminum block and heads, port fuel injection
DISPLACEMENT 302 cu in, 4951 cc
POWER **435 hp @ 6500 rpm**
TORQUE **400 lb-ft @ 4250 rpm**
TRANSMISSION 6-speed manual
WHEELBASE 107.1 in
LENGTH 188.3 in
WIDTH 75.4 in
HEIGHT 54.4 in
CURB WEIGHT 3782 lb

WARRANTY

3 years/36,000 miles bumper to bumper
5 years/60,000 miles powertrain
5 years/unlimited miles corrosion protection
5 years/60,000 miles roadside assistance

MODEL-YEAR CHANGES

2017: The redundant turn signals, visible through the hood vents only to the occupants inside the car, are eliminated, presumably for being excessively redundant.

2018: A modest facelift brings new equipment such as MagneRide dampers, an active exhaust system, and a 12.0-inch digital instrument cluster. The 3.7-liter V-6 is dropped, leaving the turbocharged 2.3-liter inline-four and the V-8, which now uses both port and direct fuel injection and receives an as-yet-unspecified power increase. Both engines are available with the new 10-speed automatic.

CAR AND DRIVER TEST RESULTS

PERFORMANCE

ZERO TO 60 MPH:

NEW 4.3 sec
40,000 4.3 sec

ZERO TO 100 MPH:

NEW 10.3 sec
40,000 10.2 sec

ZERO TO 130 MPH:

NEW 18.0 sec
40,000 17.8 sec

ROLLING START, 5–60 MPH:

NEW 4.9 sec
40,000 4.7 sec

1/4-MILE:

NEW 12.9 sec @ 112 mph
40,000 12.9 sec @ 113 mph

BRAKING, 70–0 MPH:

NEW 156 ft
40,000 166 ft

ROADHOLDING, 300-FT-DIA SKIDPAD:

NEW 0.94 g
40,000 0.96 g

TOP SPEED 161 mph (governor limited)
EPA FUEL ECONOMY, COMBINED/CITY/HWY 19/15/25 mpg
C/D-OBSERVED FUEL ECONOMY 20 mpg

LIFE EXPECTANCIES

(ESTIMATED FROM 40,000-MILE TEST)

FRONT TIRES 30,000 miles
REAR TIRES 10,000 miles
FRONT BRAKE PADS more than 100,000 miles
REAR BRAKE PADS more than 100,000 miles

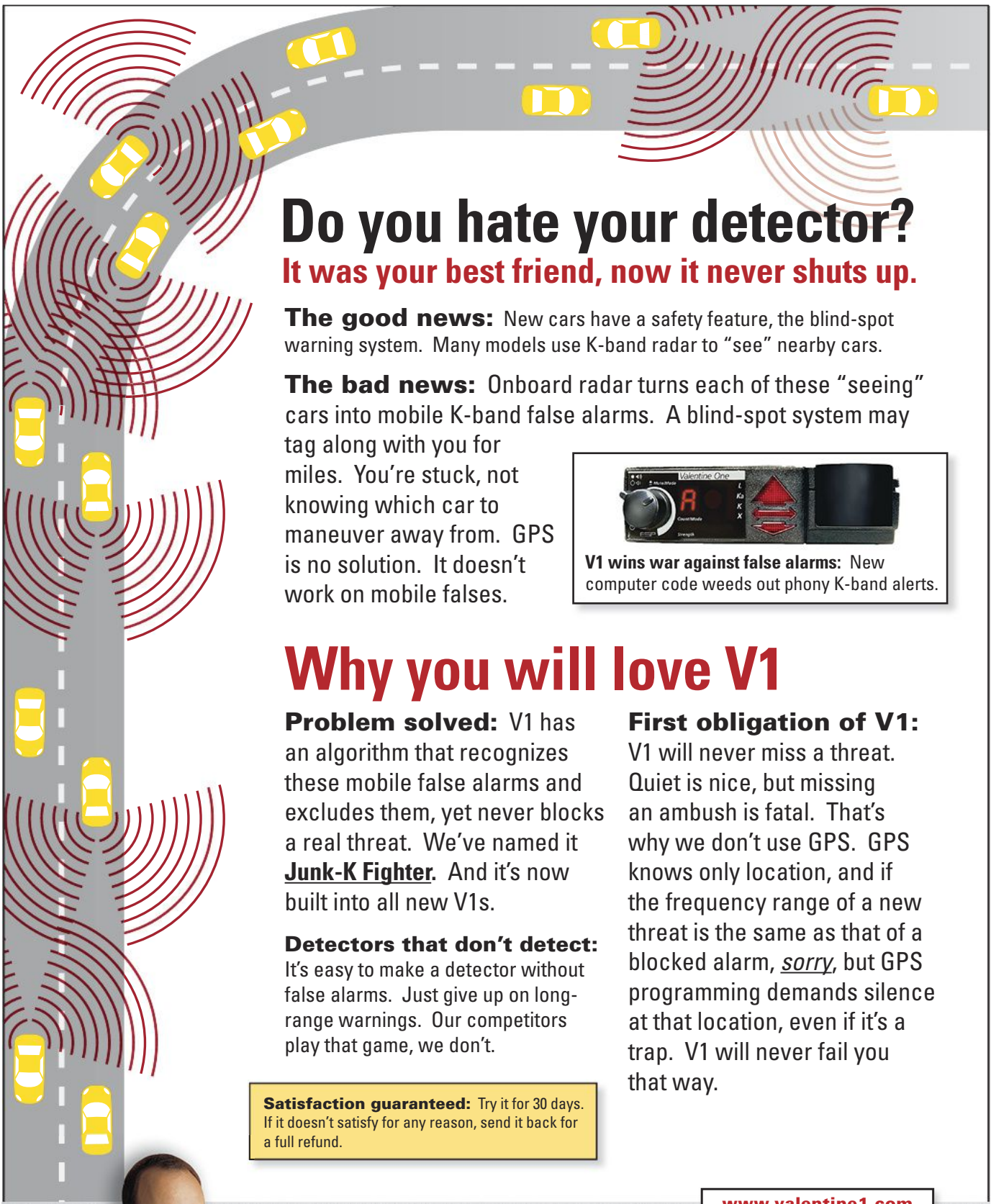
WHAT BITS AND PIECES COST

HEADLAMP \$1293
ENGINE AIR FILTER \$20
OIL FILTER \$5
WHEEL (FRONT/REAR) \$991/\$1010
TIRE (FRONT/REAR) \$218/\$254
WIPER BLADES (PAIR) \$28
FRONT BRAKE PADS \$315

5-YEAR ESTIMATED COST OF OWNERSHIP

YEAR	1	2	3	4	5	TOTAL
DEPRECIATION	\$12,890	\$3200	\$3137	\$2550	\$2638	\$24,415
FINANCING	\$1057	\$837	\$610	\$375	\$134	\$3013
FUEL	\$1905	\$2062	\$2138	\$2250	\$2325	\$10,680
INSURANCE	\$3168	\$3219	\$3280	\$3345	\$3412	\$16,424
TAXES AND FEES	\$2182	\$68	\$65	\$64	\$59	\$2438
MAINTENANCE AND WEAR	\$618	\$1817	\$678	\$1817	\$618	\$5548
REPAIRS	\$0	\$0	\$0	\$200	\$300	\$500
TOTAL	\$21,820	\$11,203	\$9908	\$10,601	\$9486	\$63,018

Depreciation data from ALG. Based on 15,000 miles per year.



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Fleet Files:

Here's how our other long-term vehicles are faring in their 40,000-mile trials:



▲ Newcomer

2017 BMW M2

Arrival: Jan/2017
Miles: 4108
Observed mpg: 23

WE'RE BOOKENDING the Bavarian branch of our long-term fleet—which already includes a BMW 740i—with an M2. Like our 7-series, the M2 is powered by a straight-six, but where the executive limo packs the all-new B58 engine, our little blue coupe is the last hurrah for the previous-generation N55. With 365 horsepower and 369 pound-feet of torque during limited-time overboost conditions (343 pound-feet normally), the M2 should hit 60 mph in about four seconds flat.

We've been a little delayed in tak-

ing the M2 to the track for its initial testing, as our break-in period was doubled by a defective differential. It's a known issue with the M2, requiring a checkup after the first 1200 miles. Good thing: We had a fluid leak and a half-shaft that had started to work its way out of engagement with the differential, so the dealer replaced the diff under warranty and reset the break-in clock. After a second checkup at 2,400 miles, we were granted a clean bill of health.

It was an inauspicious start to what promises to be an action- and enjoyment-packed 40,000 miles. Mix the brakes, wheels, and suspension bits from the M4 with the 2-series' tidier body shell and airy visibility, and good things are bound to happen. And some not-so-good things. That differential is another of the parts shared with the M4. —Jared Gall

▼ Newcomer

2016 MAZDA CX-9

Arrival: Nov/2016
Miles: 7832
Observed mpg: 20

HOW MANY AUTO BRANDS today field a top-to-bottom lineup that makes us genuinely excited? Or maybe we should rephrase that: How few? Sure, there are your Ferraris and Lambos and McLarens. Porsche probably qualifies, too. But when it comes to purveyors of mainstream vehicles, there's only one: Mazda. All three of its cars have earned 10 Best slots, and each of its current products has won a C/D comparo; the new CX-9 crossover is patiently awaiting its opportunity. In the meantime, we ordered one for a long-term test.

Just as with its other products, Mazda offers three CX-9 trim levels with minimal standalone options. The three-row crossover also gets a top-level Signature spec, and befitting such a flagship, it has essentially everything offered including all-wheel drive. So, of course, this is how ours came equipped. At \$45,955, it's fairly well loaded with 20-inch wheels, leather, a sunroof, LED headlights, and adaptive cruise control among other features. A heated steering wheel is, however, suspiciously absent from Mazda's order sheet.

A good excuse to break out the driving gloves, then, as the CX-9 aspires, like other Mazdas, to be the enthusiast's choice in the segment. Emphasis on "in the segment." That said, the CX-9's track numbers—7.1 seconds to 60 mph, 0.83 g on the skidpad, and a 168-foot stop from 70 mph—rival those of some four-cylinder BMW 3-series models. The CX-9 also drives smaller than your average familymobile, and its turbocharged 2.5-liter four makes 250 horses and 310 pound-feet of torque. The only trans is a six-speed auto, but it has a sport mode. Of course it does. —Jeff Sabatini



2017 CHRYSLER PACIFICA
6749 MILES

2017 JAGUAR XE
15,342 MILES

2016 NISSAN TITAN XD
22,455 MILES

2016 CHEVROLET CAMARO SS
32,374 MILES

2016 MAZDA MX-5
MIATA CLUB
34,309 MILES

2016 BMW
740i
36,532 MILES





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Baby Boomer

The snarling five-cylinder **RS3** is proof that Audi loves us enough to bring its fastest models. But love comes at a price. **_by Mike Duff**

▼
IN SALALAH, OMAN, where Audi flew us to drive the new RS3 sedan, we're told that a good camel can cost \$10,000. This part of the Gulf is famous for the breeding of dromedaries, and it draws Bedouin tribesmen from hundreds of miles away to barter and trade these desert schooners. Of course, there are plenty of bad camels, too, the worst of which will set you back less than \$500 worth of Omani rial. But as our guide, Khush, assures us, you definitely don't want one of the bad camels.

Quality carries a premium, of course, and the lesson holds true in compact sedans as much as even-toed ungulates. In the unlikely event a Bedouin decides he wants to trade his way into an RS3, the smallest of the U.S.-market RS models, he would have to sell a minimum of six primo-grade camels to realize the dream. Pricing isn't finalized, but we're told that this will be a \$60,000 baby Audi, nearly a 100 percent premium over the base A3 2.0T.

[+] Brilliant five-cylinder engine, great noise, more poised than previous baby RS models.
[-] Roughly \$23K more than a Ford Focus RS, no hatchback, cheap-feeling gear-selector paddles.

Well, at least we're getting the car. There have been two previous generations of RS3s, both hatchbacks and both powered by five-cylinder turbo engines, but neither crossed the Atlantic. The switch to Audi's new aluminum-block turbo five, which we've already seen in the TT RS, coincides with the decision to offer a sedan body style for the first time, the only body style judged capable of meeting U.S. tastes.

The combination of a small car with a big engine remains a compelling one, and the RS's output of 400 horsepower is pretty much exactly the right amount of too much. While Audi Sport—the renamed

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2017 EXR RACING SERIES Race Schedule



LAS VEGAS
3-H EXR 250
January 21-22



LAS VEGAS
DOUBLE SPRINT
2-H ENDURO
March 24-26



SPRING MOUNTAIN
DOUBLE SPRINT
1-H ENDURO
April 22-23



LAS VEGAS
DOUBLE SPRINT
2-H ENDURO
May 20-21



LAGUNA SECA
DOUBLE SPRINT
1-H ENDURO
June 23-25



UTAH
DOUBLE SPRINT
6-H ENDURO
August 4-6



BUTTONWILLOW
DOUBLE SPRINT
1-H ENDURO
September 23-24



SONOMA
DOUBLE SPRINT
3.5-H ENDURO
October 28-29



COTA
24-H ENDURO
November 10-12



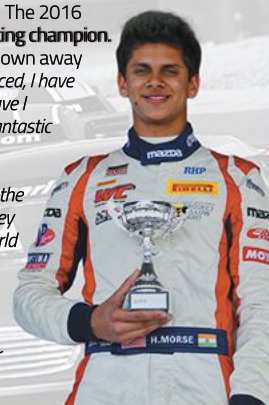
ALGARVE PORTUGAL
24-H ENDURO
November 25-26



LAS VEGAS
DOUBLE SPRINT
2-H ENDURO
December 9-10

RACING DRIVER FEATURE

At just 16 years old, Henry Morse knows a bit about racing. The 2016 Pirelli World Challenge Rookie of the Year is a ten-time karting champion. Currently leading the 2017 EXR Sprint Series, Henry was blown away by the EXR LV02 platform. "Of all the cars and karts I have raced, I have never seen vehicles so well balanced performance-wise, nor have I driven anything that was so enjoyable to drive. The LV02 is a fantastic blend of user-friendly and challenging complexity; it allows less experienced drivers to develop their skills, but at the same time demands experienced pros to dig deep in order to extract all of the performance that the LV02 has to offer. The blend of drivers they attract covers the spectrum, from the beginner to the multi-world champion, so there is always someone on the grid to race with at your level, assuring close racing, regardless of the finishing order. No other arrive-and-drive experience comes close to this level of professionalism and fun. The Las Vegas racetrack is amazing, and the staff could not be more warm, thorough, or professional. EXR resets the bar on arrive-and-drive racing."



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Quattro division—admits it could have produced a four-cylinder engine with similar output, it stuck with the five, both because Audi makes enough money to justify such a niche powerplant and also to improve drivability. As Stephan Reil, Audi Sport's head of development, puts it, "People buy on horsepower but drive on torque." With a peak 354 pound-feet available from just 1700 rpm, there's no shortage of that, either.

The 2.5-liter inline-five is, predictably, the star attraction. Audi stuck with the 1-2-4-5-3 firing order that gives the RS a captivating aural character, one that references the five-pot rallying Quattros that Audi likes to remind us it once built. Under moderate load, this engine produces a guttural roar strongly reminiscent of the V-10 in the R8. There is some lag at lower speeds, but the engine feels much deeper-lunged than its four-cylinder counterpart, and it revs with even greater enthusiasm all the way to where the 7200-rpm limiter calls time.

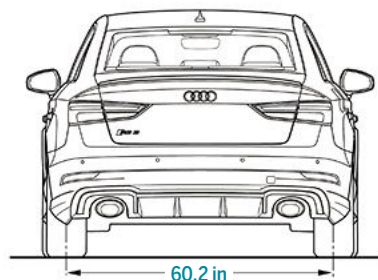
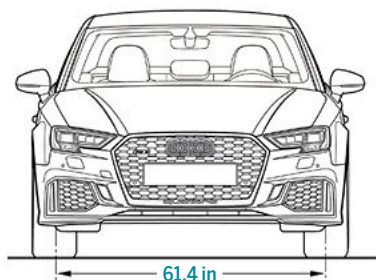
Audi's dual-clutch seven-speed transmission, which is the only gearbox option, does a predictably fine job of smoothing shifts when left in drive, but it also manages whip-crack gearchanges under manual control (these made through disappointingly light-feeling paddles) and with the Drive Select system switched to its most aggressive dynamic mode. The same all-wheel-drive system that Audi uses for its other transverse-engined models marshals torque here, though with some RS-only tweaks.

While the first RS3 was a parade float at the Festival of Understeer, this one feels both nimble and neutral when pushed hard on a winding road. Much of that is certainly due to the engine's crash diet; the aluminum unit is 57 pounds lighter than the dimensionally identical iron-block version. But a livelier rear end has certainly helped. Many of Oman's mountain roads seem to be covered by a fine sheen of sand, which may be camel poop or a combination of the two, and on low-grip surfaces the RS3 sends extra effort rearward to keep the car on course. It could even be persuaded into dinky little tail slides under harder provocation. Oman's road surfaces were too good for an in-depth appraisal of ride quality, but the

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Cars with tires wider at the rear than at the front are common, but the RS3 is one of the few to reverse the trend (Pontiac's 2006 Grand Prix GXP was the first bulldog). The RS3's front track is 1.2 inches wider than the rear as standard, but all U.S. versions will also get broader 255/30R-19 Pirelli P Zeros at the front, with 235/35R-19s at the rear. The wider fitment is optional in other markets where the 235s all around are standard. According to Stephan Reil, Audi Sport's head of development, the broader rubber increases front-end grip and reduces understeer but doesn't alter the car's front-to-rear balance enough to require any other suspension changes or recalibration of the stability-control and all-wheel-drive systems.



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2017 AUDI RS3

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door sedan

BASE PRICE: \$60,000 (est)

ENGINE TYPE: turbocharged and intercooled DOHC 20-valve inline-5, aluminum block and head, port and direct fuel injection

DISPLACEMENT: 151 cu in, 2480 cc

POWER: 400 hp @ 7000 rpm

TORQUE: 354 lb-ft @ 1700 rpm

TRANSMISSION: 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 103.6 in

LENGTH: 176.3 in

WIDTH: 70.9 in

HEIGHT: 55.0 in

PASSENGER VOLUME: 87 cu ft

TRUNK VOLUME: 10 cu ft

CURB WEIGHT: 3650 lb

PERFORMANCE (C/D EST)

ZERO TO 60 MPH: 3.9 sec

ZERO TO 100 MPH: 9.9 sec

1/4-MILE: 12.4 sec

TOP SPEED: 155–174 mph

FUEL ECONOMY

EPA COMBINED/CITY/HWY: 20/17/24 mpg

(C/D est)

RS3 feels more compliant than its TT RS sibling, and the optional carbon-ceramic front brake rotors fitted to the car we drove (with iron discs in back) worked without noise or hesitation.

Audi seems to have learned a lesson from previous RS models that looked too similar to their lesser S sisters. So if the A3 eats salads but avoids the gym, and the S3 does yoga and Pilates, then the RS3 pumps iron and has a bathroom cabinet full of steroids.

There's a new lower air intake beneath the gaping radiator grille, plus sizable sill extensions and a rear diffuser that looks only fractionally less track-ready than that of the RS3 LMS racer. The cabin gets Alcantara door panels, quilted-leather bucket seats, and a chunkier sport steering wheel along with various RS-specific displays for the Virtual Cockpit instrument screen.

The RS3 sedan confirms that Audi loves us, or certainly loves our money. We're told that 40 percent of global RS3 production will come with a trunk, the U.S. being the main reason the sedan has been put into production. We're still being denied the hatchback that will be sold elsewhere, and the RS3 wears a borderline-ridiculous price tag for something so small. But this is definitely no ordinary A3.

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Shifting Mores

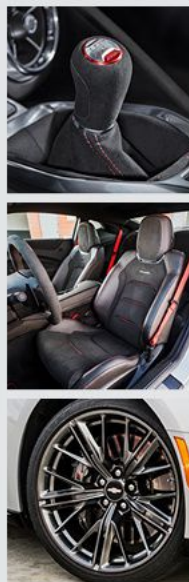
The six-cog **Camaro ZL1** uses the DIY approach to performance. *by Tony Quiroga*

▼ **EVERY SUPERLATIVE, COMPLIMENT,** and rave you've heard about the Chevrolet Camaro ZL1 collects inside your head before you drive it. A veritable Lake Mead of positivity builds up behind your mental Hoover Dam, which is just waiting to collapse under the weight of unfulfilled expectations. Except the 650-hp Camaro ZL1 not only lives up to the hype, it exceeds it, especially when equipped with a six-speed manual.

Let's get one thing out of the way: The manual is three-tenths of a second slower to 60 mph than the car's 10-speed automatic. That may sound like a deal breaker if acceleration numbers rule your sad life, but a 3.7-second run to 60 is still astonishing for a 3904-pound prop from a Michael Bay film. It also helps that the stick saves you \$1595; the base price is \$63,435.

Does it help that it does 60 mph in first gear? Actually, it doesn't. That tall first gear makes the ZL1 tough to launch. We got our best times by revving it to a needle's width above 2000 rpm, releasing the clutch pedal, and quickly rolling into the throttle. Open the throttle too fast and the Goodyear blimps in back light up like the *Hindenburg*. If you're too slow on the gas pedal, the engine bogs. This Camaro's launch control had been disabled, but we regularly beat the system anyway. Like we said: Sad!

Balancing tire slip to achieve the best launch takes some skill, but there's gratification in the DIY approach. Go ahead—jam the shifter into second as fast as you can at 60 mph and keep the gas pinned; it'll take it. Do burnouts for days, stomp on the brakes



[+] Makes all the right moves, makes all the right noises, more fun than the automatic. [-] Remember when Baby Jessica fell into the well? Sitting in the Camaro reminded us of that.

from 70 mph to zero in 141 feet as many times as you want, and circle the skidpad at 1.07 g's. Run it repeatedly to the 6500-rpm redline to hear the supercharged V-8's 96-decibel howl. The ZL1 is always happy to endure what's necessary to extract its performance. Its commitment to making your jaw drop is absolute.

A stream of feedback flows through the Alcantara-wrapped steering wheel. Chevy resisted making the wheel as thick as a Burmese python and we're grateful, not because our hands are tiny, but because the thin-rimmed wheel is the only delicate part on the entire car. That wheel, along with the lighter steering efforts afforded by the tour and sport modes, helps the big ZL1—it's roughly the length of a Toyota Camry and three inches wider—read as small and nimble as a BMW M2. Press hard into a corner and the ZL1 belies its mass by turning in with supernatural agility. There's no drama, no roll, no fuss, and should you engage the rev-matching function, no need to heel-and-toe downshift.

Here's the part where we complain about seeing out of the Camaro. Chevy built a concept car for the road, and concepts rarely consider practicality. Granted, you do get used to it in the same way you'd get used to wearing a baseball cap right above your eyes, but that doesn't change the fact that it's patently juvenile. It's paradoxical that a car so finely honed and impeccably developed looks like a full-scale Hot Wheels toy. More proof that cars shouldn't be judged by their covers. Or numbers.

2017 CHEVROLET CAMARO ZL1

VEHICLE TYPE: front-engine, rear-wheel-drive, 4-passenger, 2-door coupe
PRICE AS TESTED: \$65,230
BASE PRICE: \$63,435
ENGINE TYPE: supercharged and intercooled pushrod 16-valve V-8, aluminum block and heads, direct fuel injection
DISPLACEMENT: 376 cu in, 6162 cc
POWER: 650 hp @ 6400 rpm
TORQUE: 650 lb-ft @ 3600 rpm
TRANSMISSION: 6-speed manual
DIMENSIONS
WHEELBASE: 110.7 in
LENGTH: 188.3 in
WIDTH: 74.7 in
HEIGHT: 52.4 in
PASSENGER VOLUME: 85 cu ft
TRUNK VOLUME: 9 cu ft
CURB WEIGHT: 3904 lb

C/D TEST RESULTS

ZERO TO 60 MPH: 3.7 sec
ZERO TO 100 MPH: 8.2 sec
ZERO TO 150 MPH: 19.3 sec
ROLLING START, 5-60 MPH: 4.2 sec
1/4-MILE: 12.0 sec @ 122 mph
TOP SPEED: 191 mph (drag limited, mfr's claim)
BRAKING, 70-0 MPH: 141 ft
ROADHOLDING, 300-FT-DIA SKIDPAD: 1.07 g
FUEL ECONOMY
EPA COMBINED/CITY/HWY: 16/14/20 mpg
C/D OBSERVED: 18 mpg

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TESTED

Shock Box

Innovate or die: Chrysler's **Pacifica hybrid** is the world's first electrified minivan. *—by Josh Jacquot*

▼ **ONLY AMERICA'S MOST** ardent pragmatists choose minivan function over crossover fashion. The country's refusal to acknowledge the family van's myriad virtues—unparalleled people-carrying comfort, unmatched interior volume, and unequaled interior flexibility—might be its greatest automotive sin. Stigma, then, is strong with the guardian of the sliding door. Yet Chrysler defiantly marches the minivan forward with the electrification of its Pacifica, possibly the most significant innovation since sliding doors appeared on both sides of its 1996 vans.

Starting with the 3.6-liter Pentastar V-6 found in the standard Pacifica, FCA engineers swapped the pistons, camshafts, and valves; bumped the compression ratio; and added Atkinson-cycle capability to maximize efficiency. Then they bolted the gas mill to a continuously variable planetary-gear transmission that houses two electric motor/generators. Add-on electron propulsion never comes without compromise, however, and the Pacifica hybrid suffers the loss of the underfloor bins where the second-row seats normally stow. That space instead harbors a 16.0-kWh lithium-ion battery pack that fully charges in two hours on a 240-volt, 30-amp circuit or in just over 14 hours using a 120-volt wall plug.

The upshot is a relatively long electric-only range, which we measured at 30 miles in 30-degree weather. (Chrysler claims 33 miles using the EPA's methodology.)

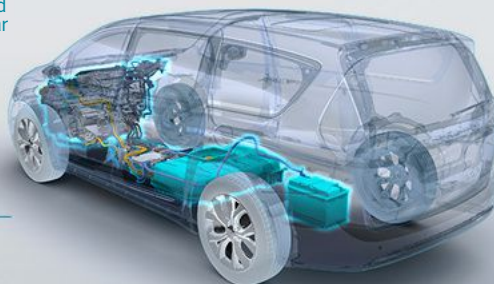
But there is technically no all-electric mode, or any other selectable mode, for

[+] Legit all-electric range, normal driving experience, Uncle Sam's mail-in rebate makes it a steal. [-] No second-row Stow 'n Go, still looks like a minivan.

replacements for the second-row stowable seats weigh a “go find your father” 66 pounds each and must be removed from the vehicle to create a flat load floor. The third row disappears into a well with a single pull-and-flap motion.

But in a minivan, where utility rules, electrification must be more than a political statement. Added value is a must. The EPA rates the Pacifica hybrid at 84 MPGe when it's operating solely on electricity from the grid. But using electricity and gasoline, we observed 28 MPGe. Considering that the gas-only Pacifica yielded 20 mpg in our hands, and assuming 12,000 miles driven annually, the hybrid needs more than eight years to recover, in fuel-cost savings, its \$2100 premium over a top-trim Pacifica Limited. But factor in the \$7500 federal tax credit and the plug-in hybrid is cheaper than the van it's based on. This Pacifica might finally pack enough practicality to outweigh its stigma. Ah, who are we kidding?

There was no need for Chrysler to tear up the Pacifica completely to integrate its battery pack. It fits nicely in the space normally used for in-floor storage bins.



that matter. Chrysler says that minivan customers don't want to have to think about maximum efficiency, so the company sets the powertrain parameters and that's that.

The electrified van steers, turns, rides, and stops in ways not unlike the standard Chrysler van, despite a 568-pound weight penalty relative to a comparably equipped Pacifica Limited. Even its regenerative brake response, an interface where drivability often leaves the building, is a believable take on traditional friction stoppers. Compared with a standard Pacifica, only a half-second of zero-to-60-mph time is sacrificed on the altar of efficiency, but at a still-lively 7.8 seconds, acceleration is something no one is likely to complain about.

An array of gauges in the instrument cluster supervises all manner of energy transmission, often redundantly. The

2017 CHRYSLER PACIFICA HYBRID

VEHICLE TYPE: front-motor, front-engine, front-wheel-drive, 7-passenger, 4-door van
PRICE AS TESTED: \$47,885

BASE PRICE: \$43,090

POWERTRAIN: 2 permanent-magnet synchronous AC electric motors, 114 and 84 hp, 231 and 92 lb-ft; DOHC 24-valve 3.6-liter Atkinson-cycle V-6, 220 hp, 235 lb-ft; combined system, 260 hp (mfr's est)

BATTERY: liquid-cooled lithium-ion, 16.0 kWh

TRANSMISSION: continuously variable automatic

DIMENSIONS

WHEELBASE: 121.6 in

LENGTH: 203.8 in

WIDTH: 79.6 in

HEIGHT: 70.0 in

PASSENGER VOLUME: 159 cu ft

CARGO: 32 cu ft

CURB WEIGHT: 5125 lb

G/D TEST RESULTS

ZERO TO 60 MPH:

7.8 sec

ZERO TO 100 MPH:

19.7 sec

ROLLING START,

5-60 MPH: 8.1 sec

1/4-MILE: 16.1 sec

@ 90 mph

TOP SPEED: 107 mph

(governor limited)

BRAKING, 70-0 MPH:

178 ft

ROADHOLDING,

300-FT-DIA

SKIDPAD: 0.82 g*

FUEL ECONOMY

EPA COMBINED:

84 MPGe/32 mpg

(battery charged/

depleted)

C/D OBSERVED:

28 MPGe

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The Pale King

The all-new **Audi Q5** continues the model's bloodless coup.
by Daniel Pund

▼ **WHEN WE LAST SUBJECTED** an Audi Q5 to our comparison-test gantlet in 2013, we described its appearance and driving demeanor as that of a dinner roll. How we knew what a dinner roll drives like, we can't quite recall. We went on to point out that the Q5 was a vehicle that "will offend no one and excite just as many."

We maintain that we were right back then, and not just because the man who wrote those words is the one now tapping out these.

Right we might have been, but 2013 was also the first year that the Q5 narrowly succeeded the A4 as the sales king of all the Audis in this land. By last year, the Q5 outsold the A4 by roughly 40 percent. And that was less than a decade after the sedan birthed the crossover.

Obviously, the Q5's white-bread bloodlessness is no disadvantage in the marketplace. All hail the Pale King.

For 2018, the Q5 gets not only a new suit of clothes but its first full reworking in the model's nine-year history. This includes a new generation of Audi's familiar turbocharged 2.0-liter four-cylinder, now making 252 horsepower and 273 pound-feet of torque, plus a seven-speed dual-clutch auto-

[+] Well-controlled ride with no harshness, quicker and more fuel efficient.
[-] Anodyne, the A4 Allroad exists.

matic in place of the last Q5's eight-speed conventional automatic and an all-new platform that integrates more aluminum bits.

But like the recently renewed A4 and A4 Allroad, the Q5 is a very familiar all-new car. At a glance, the '18 Q5 is the same vehicle, the new model being within an inch of the vehicle it replaces in every major dimension. It's 10 pounds heavier than the

old one—that's the equivalent of 10 pounds of feathers or rocks or grape-flavored Pez—and a closer look reveals a couple of new curves above the wheels, a lazy rolling wave along the sides of the thing. The Q5, like the BMW X3 and the Mercedes-Benz GLC300, is pleasantly inoffensive, soft in shape and in impact. There are more-distinctive-looking crossover options out there, from the edgy Cadillac XT5 to the grotesque Lexus RX.

But there is essentially no air between the German entries in this class. They are near identical in size. The entry-level versions are all powered by turbocharged 2.0-liter four-cylinder engines. They all weigh around 4100 pounds. They all claim to get to 60 mph within a few tenths of a second of one another. And who cares about a tenth of a second in the Trader Joe's parking lot?

It's a striking example of convergent evolution. Furthering the push toward indistinguishableness, Audi is touting the new model as a vehicle that has the "sporty characteristics of a sedan with the off-road capabilities of an SUV." That moves the Q5 into the sphere of sportiness occupied by the BMW X3. Neither of these claims is entirely true, of course.

Yes, the Q5 comes with an off-road setting, accessible through its Drive Select mode toggler, which locks the drivetrain into all-wheel drive. Like the A4 Allroad's, the Q5's all-wheel drive is an on-demand

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system called Quattro with Ultra, meaning that it's a front-wheel-drive vehicle most of the time. No shame in that. The system operates seamlessly and is credited by Audi with helping deliver the new model's 3-mpg improvement in city fuel economy. But an off-roader this is certainly not.

A quick drive in the new Q5 reveals much better body control than the first-generation vehicle. There's nothing tricky going on here. The Q5 is not offered with air springs. And our mid-level Premium Plus version had no adjustable dampers. But the coil springs, the fixed-rate dampers, and the rest of the suspension are tuned to deliver a well-controlled ride, free of float, while rounding the edges off sharp impacts, even with the Q5 wearing the optional 20-inch wheels.

But a lack of floppiness does not a sporty vehicle make. The Q5 feels refined to the point of flavorlessness. A large part of the problem is the steering system. This is the kind of steering that gives electrically assisted systems a bad name. It's accurate, and its 15.8:1 ratio is quick enough, but it is so utterly devoid of feel that not only is the "sporty characteristics of a sedan" descriptor revealed as bogus, even non-enthusiast drivers might be put off by the artificiality of the steering. It also makes the Q5 feel slightly unsettled on the expressway as its nose seems to drift to and fro with nary a murmur through the steering wheel. At least the Q5's brake-pedal feel and stopping performance (161 feet from 70 mph) are top-notch for the class.

Audi certainly offers a nice turbo 2.0-liter, which is fortunate because it's the only engine available in the regular Q5 (the high-performance SQ5 will be powered by a turbocharged 3.0-liter V-6). It makes more horsepower than the fours in its German cousins. Okay, it's only 12 more than the BMW and 11 more than Mercedes, but a win is a win. Allied with the new dual-

clutch, the Q5 gets to 60 mph in 5.8 seconds, or 1.1 quicker than the old version. That makes it a bit fleetier than the other German four-bangers—and most V-6-powered competitors.

To achieve that number, we needed to turn off the Q5's traction-control system, something owners are very unlikely to do on a regular basis. Leave traction control on and the duration to 60 mph is 6.2 seconds. Still plenty quick. Not as quick as an A4 Allroad, which also stops shorter, grips harder, goes farther on a gallon of gas, and has a cargo hold only 2.6 cubic feet smaller (behind the rear seat). But we digress.

But like the Allroad, the Q5 has a visually quiet, near-minimalist interior style. It's a calming place. Without flashiness to distract and confuse the eye, minimalism invites greater scrutiny of material quality, and here Audi does pretty well. The only truly cheap-feeling pieces are reserved for the back seat and cargo areas.



Crowd pleaser: Like other new Audis, the Q5's instrument panel can be configured to display Google Earth or Google Street View. Or no Google at all.

Audi has wisely chosen to sacrifice a bit of cargo space to improve rear-seat legroom in the new model. The second-row seats now slide fore and aft a few inches and also are adjustable for recline. Maximum cargo space is up by a few cubic feet (to 60) with the rear seats folded. Other than our test car's optional panoramic roof cutting into rear-seat headroom a bit, the rear quarters are comfortable for six-footers—even when sitting behind similarly sized humans. Only the two rear outboard seating positions can accommodate adults. The large tunnel means the center spot is strictly for tiny people.

Naturally, the Q5 comes with the most up-to-date in Audi electronics magic, including a new version of the always-intuitive MMI infotainment interface and the so-called Virtual Cockpit, which replaces physical gauges with a large screen. It can be configured to display a sprawling Google Maps view that is sure to impress your passengers. Well, the Q5 "comes" with all of this assuming you pay the extra \$2600 for the navigation package, which also includes a navigation system.

The new Q5 carries a base price of \$42,475. Our Premium Plus test car included LED headlights, a panoramic sunroof, heated front and rear seats, a heated steering wheel, a Bang & Olufsen audio system, navigation, and various other niceties for \$52,700, par for this particular hole. You might not be surprised to learn that the Mercedes GLC300 4MATIC and the BMW X3 xDrive28i have base prices within \$500 of the Q5's.

2018 AUDI Q5 2.0T QUATTRO

VEHICLE TYPE: front-engine, all-wheel-drive, 5-passenger, 4-door hatchback

PRICE AS TESTED: \$52,700

BASE PRICE: \$42,475

ENGINE TYPE: turbocharged and intercooled DOHC 16-valve inline-4, iron block and aluminum head, direct fuel injection

DISPLACEMENT: 121 cu in, 1984 cc

POWER: 252 hp @ 6000 rpm

TORQUE: 273 lb-ft @ 1600 rpm

TRANSMISSION: 7-speed dual-clutch automatic with manual shifting mode

DIMENSIONS

WHEELBASE: 111.0 in

LENGTH: 183.6 in

WIDTH: 74.5 in

HEIGHT: 65.3 in

PASSENGER VOLUME: 102 cu ft

CARGO VOLUME: 27 cu ft

CURB WEIGHT: 4180 lb

C/D TEST RESULTS

ZERO TO 60 MPH: 5.8 sec

ZERO TO 100 MPH: 16.5 sec

ZERO TO 120 MPH: 27.9 sec

ROLLING START,

5-60 MPH: 6.5 sec

1/4-MILE: 14.5 sec

@ 95 mph

TOP SPEED: 128 mph

(governor limited)

BRAKING, 70-0 MPH: 161 ft

ROADHOLDING,

300-FT-DIA

SKIDPAD: 0.81 g*

FUEL ECONOMY

EPA COMBINED/CITY/

HWY: 25/23/27 mpg

C/D OBSERVED:

21 mpg

*Stability-control-inhibited.

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Righteous Fashion

Mazda's **MX-5 Miata RF** makes bedfellows of form and function. *by Alexander Stoklosa*

▼ **THE MX-5 MIATA RF**, or “Retractable Fastback,” cuts a strikingly sexier profile than the third generation’s Power Retractable Hardtop model that it replaces. Where that old Miata’s hard roof resembled a helmet, the RF’s arcing sail panels and styled targa hoop, all made of composite plastic, make a case for the “fastback” label.

In automotive terms, the RF mixes a little Porsche 911 Targa with our favorite affordable sports car. Prices start at \$32,430 for the firmer-riding Club and \$33,495 for the feature-rich Grand Touring. Those MSRPs are \$2755 and \$2555 higher than their roadster equivalents, though the ragtop’s cheaper Sport trim isn’t available here.

Although the RF’s flair is justification enough for the higher price, its four-season advantage over the loud, cold roadster doesn’t hurt. The aluminum and steel insulated panels overhead, which reduce pompadour room slightly, convincingly mimic a fixed roof and markedly quiet the MX-5’s cabin.

With the top stowed, a trick that doesn’t further marginalize the Miata’s already marginal cargo space, the headroom problem turns into a wind problem. At freeway speeds, air tumbles off the side mirrors and windshield and catches on the targa hoop, rushing into the cabin from all directions. Raising the windows reduces the tornado to a Flowbee-like head skimming. Lower speeds reduce the breeze to a tolerable level. Simpler yet: Stick to third-gear roads, where the MX-5 thrives.

None of the roadster’s spry character is dulled by the roof and its smattering of sound-attenuating measures. Mazda says the RF model weighs 113 pounds more than the roadster. But our scales indicate a smaller difference of 105. The extra mass is

[+] Coupelike practicality, still a Miata at heart.

[-] Wind. Lots and lots of wind. And an additional 105 pounds matters to some people.

mostly situated behind the cabin, tipping the Miata’s weight balance slightly rearward, to almost exactly 50/50.

Aside from stiffening the suspension to account for the roof’s mass and tightening the tolerances inside the manual transmission to reduce whine, Mazda altered the Miata in no other way to produce the RF. The Miata’s 155-hp inline-four remains paired with either a six-speed manual or automatic transmission. Tested here in Club guise, the RF is just 0.3 second slower to 60 mph yet grips better than our long-term Miata Club. What did you expect? It’s a Miata that went nuts at a haberdashery. We only wish there were a pop-up wind blocker atop the windshield—as long as it didn’t look really ugly. 🚩

top tidbit

RF, A.K.A. “ROOF FOLDS”

Beneath the RF’s demi-fastback addendum hides an adaptation of the MX-5’s old power-retractable hardtop mechanism, only with quieter actuators and fastback-like buttresses instead of a tonneau cover. Flicking a dashboard switch lifts the fastback up and back while the front panel unlatches and accordions behind the seats along with the rear panel and the back window. The buttresses then return to their original position. To spare the top’s spindly arms and actuators, the dance is limited to sub-6-mph performances.



2017 MAZDA MX-5 MIATA RF

VEHICLE TYPE: front-engine, rear-wheel-drive, 2-passenger, 2-door targa

PRICE AS TESTED:

\$35,830

BASE PRICE: \$32,430

ENGINE TYPE: DOHC

16-valve Atkinson-capable inline-4,

aluminum block and

head, direct fuel

injection

DISPLACEMENT:

122 cu in, 1998 cc

POWER:

155 hp @ 6000 rpm

TORQUE:

148 lb-ft @ 4600 rpm

TRANSMISSION:

6-speed manual

DIMENSIONS

WHEELBASE: 90.9 in

LENGTH: 154.1 in

WIDTH: 68.3 in

HEIGHT: 49.0 in

PASSENGER VOLUME:

48 cu ft

TRUNK VOLUME: 4 cu ft

CURB WEIGHT: 2429 lb

G/D TEST RESULTS

ZERO TO 60 MPH:

6.1 sec

ZERO TO 100 MPH:

17.5 sec

ZERO TO 120 MPH:

31.3 sec

ROLLING START,

5–60 MPH: 6.6 sec

1/4-MILE: 14.8 sec

@ 93 mph

TOP SPEED: 131 mph

(drag limited)

BRAKING, 70–0 MPH:

171 ft

ROADHOLDING,

300-FT-DIA

SKIDPAD: 0.89 g

FUEL ECONOMY

EPA COMBINED/CITY/

HWY: 29/26/33 mpg

C/D OBSERVED:

29 mpg

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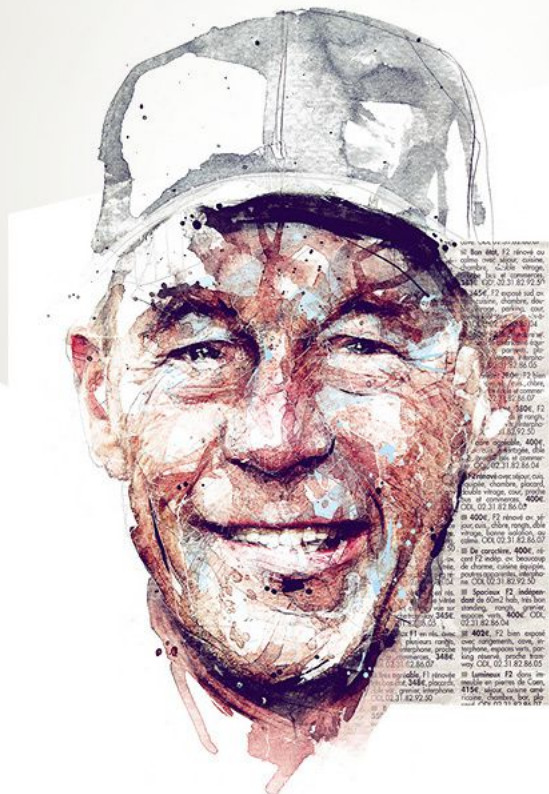
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What I'd Do Differently

John Buffum, 73

With 120 victories, 11 U.S. titles, and 9 combined U.S. and Canadian championships, John Buffum is the most decorated driver in American rally history.

► interview by JOSH JACQUOT



C/D: Early in your career, you had a reputation for crashing frequently and even earned yourself a nickname—*Stuff 'em Buffum*. Was there an occurrence that made you transition into a more mature and faster driver?

JB: No, it was an experience thing. I wanted to go fast and I crashed because I was going faster than my skill and experience level would allow. I believe that's the correct way to go. Going fast to start and then gaining experience and tempering yourself as you mature makes you faster in the end.

■ Did you ever drive on emotion and make errors that you wouldn't have made otherwise?

□ No, I don't think I was an emotional driver. I think I am an emotional guy because I cry at some movies, but no, I don't get jacked up

and have road rage. I drove to win.

■ Who was your biggest rival?

□ That's easy. Rod Millen. He was right there from the late '70s until I stopped in the later '80s. He would push me to go faster and to get better. And it was the same for him. We ratcheted each other up.

■ What was your proudest moment as a driver?

□ It's a tossup between the fifth place at Acropolis, a World Championship event, and winning Cyprus. Ferdinand Piëch, the Audi head of technical development at the time, gave me his Audi jacket to wear to the awards ceremony at Acropolis. That was an honor. I still have the jacket. Cyprus was a win, but it was a European Championship event, a step down from a World event.

■ What was your greatest talent?

□ I think I measured myself pretty well. Yes, when I started, I crashed a lot, but it gave me insight as to where I could and couldn't go. I've seen many times that [new] people in the sport don't know what fast is. I found out by crashing, so that when I got into a factory drive, I knew where the boundary was.

■ And your greatest weakness?

□ I love the gravel, and so I like to slide the car. It feels good. The way to set a car up [into a corner], especially a two-wheel-drive car, is to get it extremely sideways. Doing that makes you excel in the tighter corners. I didn't do so well in the faster corners. I wouldn't charge over blind crests. I'm not Travis Pastrana. I wasn't willing to take those chances.

■ You shared the Group B era with some big names, including the only woman to win a World Championship rally, Michèle Mouton. Could you beat her?

□ It depends on the rally. In America, we didn't use pace notes back then, so we were always one step behind the Europeans. Because we didn't compete against each other all the time on equal footing, it's hard to compare. She was very good. But when I raced Mouton, we were always close.

■ How were those Group B cars?

□ They were awesome but hard to control. Innovation and technology have changed the world. Go look back in the '80s. The cars would land and the drivers were working to keep them under control. The suspensions weren't so good, and the transmissions were street-based. They hadn't really come up with anti-lag, though Audi fooled around with it. Your eyes bounced in your head, so driving them was tremendously difficult.

■ Were the risks worth the rewards in an era of aluminum roll cages, no HANS devices, and spectators lining the roads? Would you do it again?

□ It took huge outside forces to stop the advancement of Group B in '85 and '86 [the death of Henri Toivonen]. And it was the right thing to do. Before that it wasn't so bad. I'd absolutely do it again. I never worried about it.

■ In 1987, you won every national rally you entered. You were in your mid-40s by then. Was that

the peak of your driving skill?

How did age impact your driving?

□ Sometime between 40 and 45, you start slowing down. I was very young for my age, so even in '84, when I was 41, I was at the top of my game. I was in good mental and physical shape. I had a lot of experience, and I had a good car. It all blended together.

■ What legacy do you want to leave in rallying?

□ I'd like to be remembered as somebody who loved rallying and who, as a driver, co-driver, organizer, or steward, tried to make rallying better. I hope people think of me as a championship-caliber driver. I may not have always been as polite as I could have been, but I'm not so sure that winners in sports are always nice guys.

■ Is there anything you'd do differently?

□ I wouldn't have done anything differently. But if I had really wanted rallying to be the focus of my life to the exclusion of everything else, I needed to go live in Europe. I didn't really care about doing that. There were other things going on in my life. I loved America, and I was happy to stay here for most of my competition career. But to get even better, going to Europe was a necessary thing. ■

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